ORDER NO. VRD-7504-195

Service Manual

Portable Video Tape Recorder

NV-3085-E

SPECIFICATIONS

Power Source:	DC 11~15 V (12 V Standard)
Power Consumption:	14 W (at 12 V)
Reel Size:	Max. 5″ Reel
Tape Width:	1/2″
Recording Time:	36 minutes max. with NV-P43H (4.5 Reel)
Fast Forward & Rewind Time:	Within 4 minutes
Tape Speed:	16.322 cm/sec.
Video Recording System:	2 Rotary HPF* Video Heads, Helical Scanning, EIAJ/CCIR Standard (625 lines, 50 fields, 2:1 Perfect Interlace)
Video Modulation System:	Both-sideband Frequency Modulation
Horizontal Resolution:	More than 340 lines (on Monoscope Test Pattern)
Video Frequency Response:	More than 2 MHz, −6 dB (1 MHz, 0 dB)
Video Input Level:	0.5~1.5 Vp-p, 1 KΩ, Unbalanced
Video Output Level:	1 Vp-p, 75Ω, Unbalanced
Video S/N Ratio:	More than 40 dB
Audio Frequency Response:	80~10,000 Hz ±3 dB
Audio Input Level:	−20 dB, 100 KΩ or more, Unbalanced MIC: −65 dB, 1 KΩ, Unbalanced
Audio Output Level:	1 V rms, 3 KΩ or less
Audio S/N Ratio:	More than 40 dB (JIS)
Operating Temperature:	5~40°C (41~104°F)
Operating Humidity:	35~80%
Dimensions:	302 (W) × 349 (H) × 141 (D) mm
Weight:	8 kg. (Including Batteries and Tape)
Additional Function:	Stop Action, Audio Dubbing, Playback on Regular TV with RF Converter
Operation Position:	Horizontal & Vertical
Batteries Duration:	Approx. 60 minutes or more
Batteries Charging Time:	Approx. 8 hours
Standard Accessories:	Empty Reel (VFR5012N) ..... 1 Battery (TY-357C) ..... 2 Earphone (VBE1) ..... 1 Splicing Tape (VFS1) ..... 1 Shoulder Band (VYC0012) ..... 1 Head Cleaner (VFK27) 1
Optional Accessories:	Carrying Case (NV-S49) ..... 1 VTR-TV Monitor Connection Cable (VJA47A) ... 1

* Trade Mark

Specifications are subject to change without notice.

National

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

INTRODUCTION

National Portable Video Tape Recorder model NV-3085-E is designed for both recording and playing back of EIAJ/CCIR standard video tape in B/W.

Its high precise mechanism and exacting electronic performance surely guarantee the tape interchangeability to NV-3000E series and NV-5000A-E series units on B/W.

NV-3085-E has some special functional features: automatic video and audio recording level control, automatic tape end shut-off switch interconnecting to WV-3085-E portable video camera tally light, audio dubbing facility, stop action and playback on view finder of WV-3085-E portable video camera which is convenient for speedy confirmation of recorded material.

Reproduction on conventional TV receiver is possible by use of RF converter models NV-U46, NV-U47, NV-U480/481, NV-U483/484.

Panaloid battery (TY-357C), car battery (car battery cord NV-C28) and household AC power (through AC adaptor) NV-B40E are available to NV-3085-E as power source.

Just slightly ahead of our time.....National

FEATURES

1. **EIAJ/CCIR standard VTR.**
2. **High density tape assures superb picture guality.**
3. **RF converter NV-U46, NV-U47,NV-U480/481, NV-U483/484 (optional) for playback on conventional TV receivers.**
4. **Automatic video and audio recording level control (AGC).**
5. **Exclusive HPF* heads for longer head life (more than 2,000 hrs) and higher picture quality.**
6. **Complete tape interchangeability with all VTRs of EIAJ/CCIR standard.**
7. **Built-in overdischarge-proof device for longer battery operation.**
8. **Compact, light weight and easy to operate.**
9. **Audio dubbing and still framing.**
10. **Battery operation, car battery operation with NV-C28 (optional), or AC power operation with AC adaptor NV-B40E (optional).**
11. **Equipped with video and audio outputs.**
12. **Instant playback on camera's 1-1/2 inch viewfinder.**

* **Trade Mark**

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MAJOR OPERATING COMPONENTS & THEIR FUNCTIONS

1 **HEAD HOUSING**

2 **SUPPLY REEL**

17 **TAKEUP REEL**

3 **PAUSE BUTTON**
Press this button to watch a still picture.
* A still image can be seen only while this button is depressed. If this button is pressed during recording, the tape is stopped and recording cannot be performed.

4 **RECORD BUTTON**
By depressing the record button, both video and audio levels can be seen without moving the tape. To start recording, push the play button while pressing the record button, and then pull the trigger switch on the camera.

16 **BATTERY INDICATOR**
Indicates battery power level.

15 **POWER SWITCH**

5 **PLAY BUTTON**
For playback of previously recorded tape.

6 **FAST FORWARD BUTTON (F.F.)**
By pushing this button, the tape will be rapidly advanced forward.

14 **MICROPHONE JACK**
For connection of a microphone.

7 **REWIND BUTTON**
To rewind the tape rapidly.

13 **RF CONVERTER OUTPUT CONNECTOR**
The RF output signal is supplied to a home TV receiver from this connector when RF converter (NV-U46 or NV-U47) is connected.

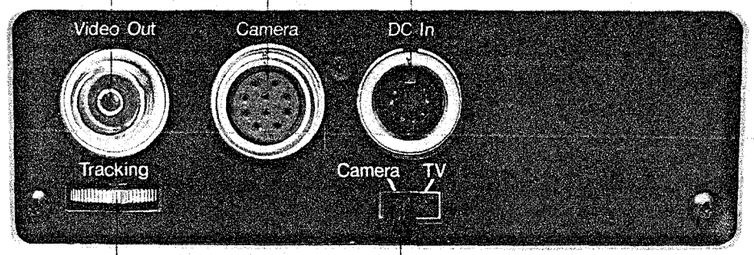
8 **STOP BUTTON**
To stop the tape.

9 **AUDIO DUBBING BUTTON**
To record on the audio channel only, depress this button during playback and with a microphone connected to the microphone jack.

12 **EARPHONE JACK**
For connection of an earphone.

11 **TAPE COUNTER**

10 **COUNTER RESET BUTTON**
To reset the counter to zero, push this button.



18 **VIDEO OUTPUT JACK (Video Out)**
Use the coaxial cable to make a connection to the VIDEO IN terminal of another video tape recorder or television set. Only the Video signal can be obtained from this terminal.

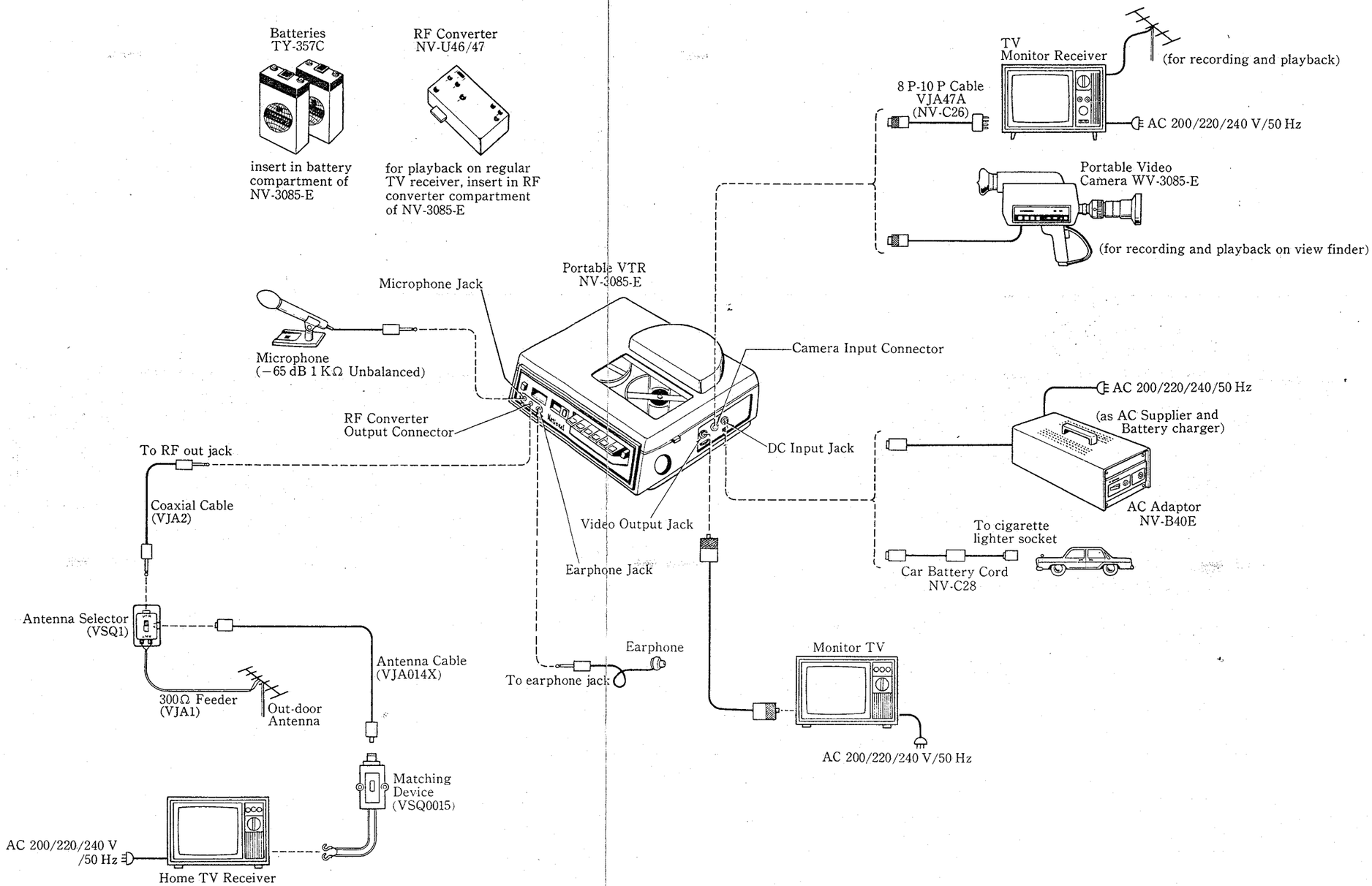
19 **CAMERA INPUT CONNECTOR (B/W Camera)**
For connection of a portable camera or monitor TV with 8-pin/10-pin TV connection cable (VJA47A).

20 **DC INPUT JACK (DC In)**
For connection of AC adaptor (NV-B40E) or car battery cord (NV-C28).

21 **INPUT SELECTOR (TV, Camera)**
To select either, TV or portable camera as the input source.

22 **TRACKING CONTROL (Tracking)**
Cancels the "noise" which may appear when a tape recorded on another recorder is played back on this unit.

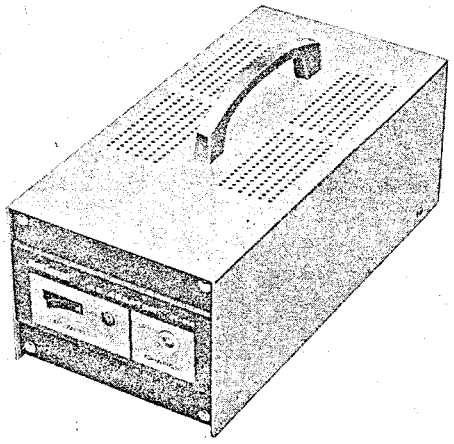
GENERAL CONNECTIONS & APPLICATIONS



ACCESSORIES

AC ADAPTOR NV-B40E

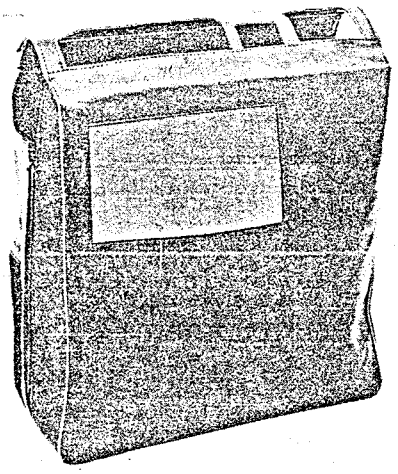
Used to supply DC power (12 V, 1.8 A) converted from home AC current (200/220/240 V, 50 Hz) to NV-3085-E and charging the batteries installed in NV-3085-E.



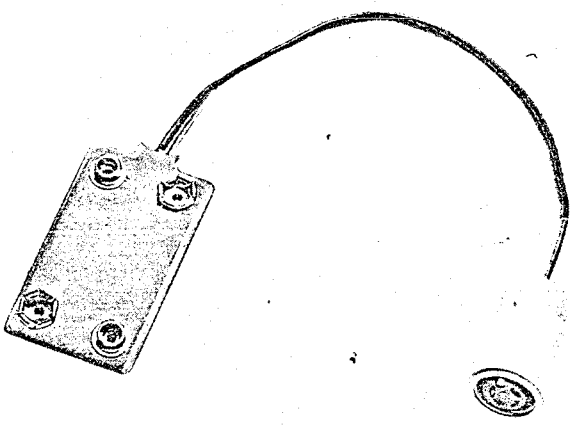
SPECIFICATIONS:

Primary Input Voltage:	AC 200/220/240 V, ±10%
Primary Input Current:	AC 0.48 A
Power Frequency:	50 Hz
Secondary Output Voltage:	DC 12 V (P201/2-4: 12.5 V / P201/3-4: 12.7 V)
Secondary Output Current:	DC 1.8 A (P201/2-4: 1.9 A / P201/3-4: 0.6 A)
Batteries Charging Time:	Approx. 8 hours
Dimensions:	126 (W) × 98 (H) × 256 (D) mm
Weight:	Approx. 3.8 kg.

CARRYING CASE NV-S49 (OPTIONAL)

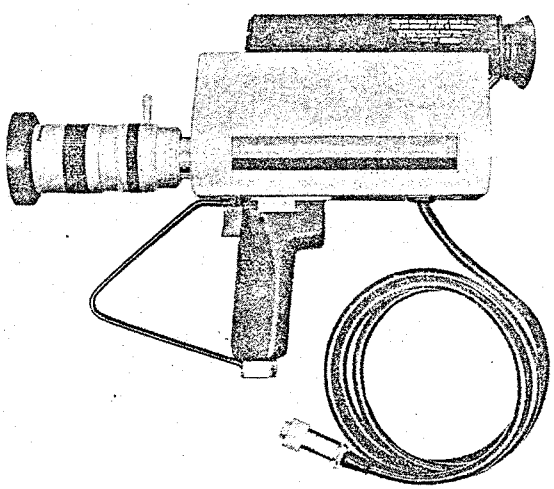


CHARGING CORD (VJA0076) ATTACHED WITH NV-B40E



PORTABLE CAMERA WV-3085E

In conjunction with NV-3085-E, permits to reproduce the video image for recording on the video tape and to playback the video image recorded on the video tape on the camera view-finder.



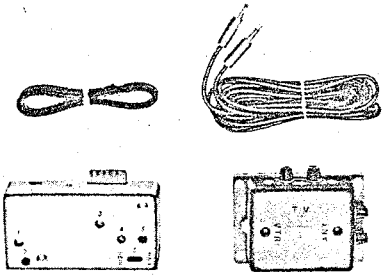
SPECIFICATIONS:

Power Requirement:	DC 12 V, 0.75 A (Supplied by VTR)
Power Consumption:	Approx. 8 W
Scanning System:	625 lines, 50 fields, 2:1 Interlaced with External Sync
Standard Lens:	15~75 mm, f: 1.8, C mount
Vidicon:	2/3″ Separate Mesh Vidicon Tube
Video Output Level:	1 Vp-p, Sync Negative, 1 KΩ
Horizontal Resolution:	Greater than 450 lines
Video S/N Ratio:	Better than 40 dB
Minimum Illumination:	50 lux
View Finder:	1-1/2″ Picture Tube Built-in
Microphone:	Electret Condenser Microphone Built-in
Dimensions:	90 (W) × 266 (H) × 395 (D) mm
Weight:	2 kg (Including Zoom-lens and Microphone)
Standard Accessories:	Zoom-lens (15~75 mm, f: 2.1) 1
	Camera grip (YWV3082-GRIP) 1
	Camera cap (YWBC-2A) 1
	Polishing Cloth 1
Optional Accessories:	Extension Cable, 7A-16 (16 ft.)
	Extension Cable, 7A-32 (32 ft.)
	Camera Adaptor, NV-S40

RF CONVERTER NV-U46/U47

SPECIFICATIONS

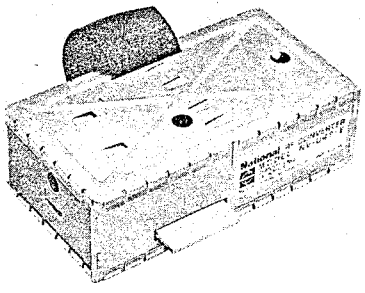
Power Voltage:	DC 12 V±1 V (supplied from NV-3085)
Channel:	CCIR TV standards NV-U46(S), Swedish CH-3 (LOW) & (HIGH) NV-U46(I), Italian CH-A (LOW) & CH-B (HIGH) NV-U46(A), Australian CH-4 (LOW) & CH-5 (HIGH)
Video Carrier Frequency:	NV-U46(S) 55.25 MHz (CH-3), 62.25 MHz (CH-4) NV-U46(I) 53.75 MHz (CH-A), 62.25 MHz (CH-B) NV-U46(A) 95.25 MHz (CH-4), 102.25 MHz (CH-5)
Audio Sub-carrier Frequency:	4.5 MHz±0.2%
Video Input:	1.1 Vp-p±0.15 Vp-p (High Impedance)
Audio Input:	4 Vp-p±2 Vp-p (1 KΩ)
RF Output:	60 dB or more (1 mV or more)
Output Inpedance:	75Ω
Modulation Ratio:	40% or more
Weight:	150 g
Dimensions:	30(H) ×51(D) ×95(W) mm
Accessories:	Switch Box (VSQ1) ..... 1 pc. 300Ω Feeder (VJA1) ..... 1 pc. Coaxial Cable with Plug (VJA2) ..... 1 pc.

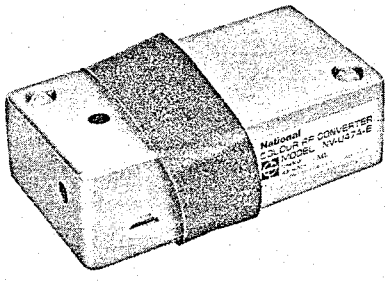


RF CONVERTER NV-U47A-E/B, NV-U47-E/B

SPECIFICATIONS:

	NV-U47-E/B	NV-U47A-E/B
Power Source:	DC 9 V	DC 9 V
Power Consumption:	Approx. 70 mA	Approx. 50 mA
Video Input:	1 Vp-p±0.25 Vp-p, 1 KΩ unbalanced	1 Vp-p±0.25 Vp-p, 1 KΩ unbalanced
Audio Input:	1 Vrms±0.25 Vrms, 10 KΩ unbalanced	1 Vrms±0.25 Vrms, 10 KΩ unbalanced
RF Output Impedance:	75Ω unbalanced	75Ω unbalanced
Video Carrier Frequency:	663.25 MHz (UHF 45-CH) (Adjustable between CH-43~CH-47)	663.25 MHz (UHF 45-CH) (Adjustable between CH-43~CH-47)
Video Carrier Output:	67±3 dBμ/75Ω	67±3 dBμ/75Ω
Video Modulation Ratio:	65±5%	70±5%
Video S/N Ratio:	40 dB or more	40 dB or more
Audio S/N Ratio:	40 dB or more	40 dB or more
Audio Sub-carrier Frequency:	5.5 MHz higher (NV-U47-E) 6.0 MHz higher (NV-U47-B)	5.5 MHz higher (NV-U47A-E) 6.0 MHz higher (NV-U47A-B)
Operating Temperature:	−5°C~40°C	−5°C~50°C
Operating Humidity:	35~80%	35~80%
Dimensions:	92.4(W) ×50.4(D) ×29(H) mm	95(W) ×51(D) ×30(H) mm
Weight:	139 gr	150 gr.





CIRCUIT DESCRIPTIONS

Video Circuit

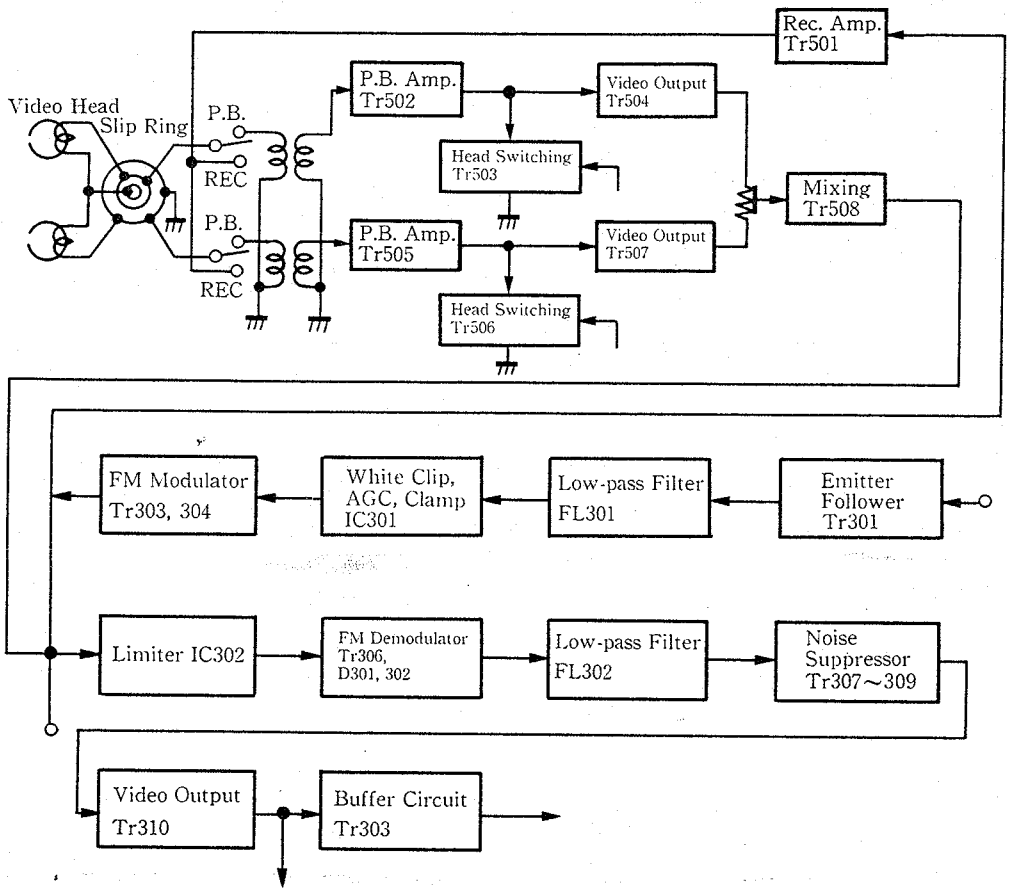


Fig. 1

RECORDING MODE

At the first time, video input signals are supplied to the emitter follower (Tr301), and are fed through the low pass filter which eliminates unessential high frequency signals in order to facilitate the recording on the tape. Then the remaining composite video signal is routed to the automatic gain control circuit (IC301) for automatic adjustment of the video signal level. In the video amplification pre-emphasis circuit (IC301), the higher range of signals passed through the low pass filter are emphasized. The signal passed along to clamp circuit (IC301) and white clip circuit (IC301) onwards as the modulating signal to FM modulator (Tr303, 304). Signals modulated at the FM modulator are fed to the video recording amplification circuit (Tr501) and are amplified until video recording current can amply be supplied to the video head. At this time the recording current must be set correctly so that the head output will be maximum during playback. FM modulated signals are driven through the limiter circuit (IC302), FM demodulator circuit (D301, 302, Tr306) and low pass filter (FL302), and demodulated and reformed into video composite signals. The signals go through the noise suppression circuit (Tr307~309) which completely removes noise contained in signals, and then enter the video output circuit (Tr310). Thus the signals are reproduced on the monitor TV and the picture being recorded can be monitored (an E-E picture). The video recording input level is, in the case of automatic gain control, determined by the AGC circuit, while in manual control. When input level runs excessively, over-modulation is forcibly indicated as a white portion of the E-E picture turns stripped.

PLAYBACK MODE

When the recorded tape is played back, playback FM signals induced by the video head are fed to the playback amplifier through the slip ring. Signals amplified at the playback amplifier circuit (Tr502~508) are fed to the amplitude control circuit, where amplifier variation caused by uneven contact between tape and head, etc., is made for the flattest response consistent with the optimum signal to noise ratio before demodulation. Clipped signals go through the FM demodulator circuit and low pass filter, and then are demodulated into the original signals. These demodulated video signals are driven through the noise suppression circuit at which noise contained in video signals is removed completely and through the video output circuit the signals are fed to the monitor TV.

CONSTRUCTION OF IC301 (AN302)

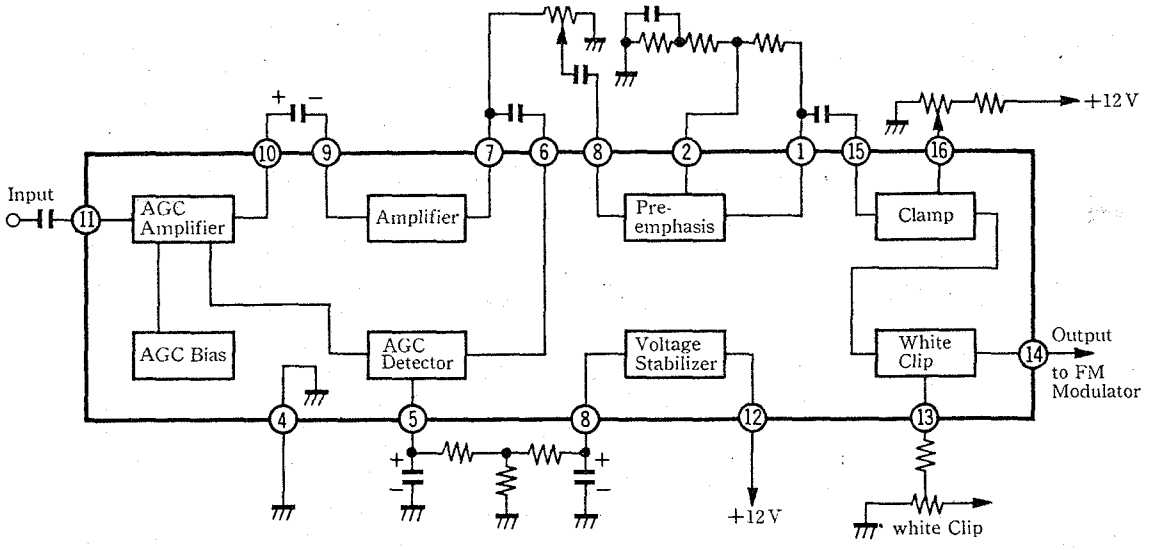


Fig. 2

Type No.	Application	Maximum Ratings (Ta=25°C)			Electrical Characteristics (Ta=25°C)					
		Item	Rating	Unit	Item	Condition	Min.	Typ.	Max.	Unit
AN302	VTR Video AGC Circuit	$V_{12\text{-}4}$	15.6	V	Itot	$V_{12\text{-}4}$=12 V	15	25	35	mA
		$V_{13\text{-}4}$	9~12	V	V_{11}	$V_{12\text{-}4}$=12 V	2	3	4	V
		I_1	−5	mA	$A_{AGC⑦}$	$V_{12\text{-}4}$=12 V, f=10 kHz, Vi=0.5 Vp-p, −10~+5 dB	1	1.3	1.6	Vp-p
		I_4	−45	mA	$C_{AGC⑦}$			0.5	1	dB
		I_7	−5	mA	$G_{AGC⑦}$	$V_{12\text{-}4}$=12 V, f=10 kHz, Vi=0.1 Vp-p	20	22	25	dB
		I_{14}	−55	mA	$SN_{AGC⑦}$	$V_{12\text{-}4}$=12 V, Video Signal 0.15 Vp-p	45	50	55	dB
		Itot	45	mA	Gf	$V_{12\text{-}4}$=12 V, f=5 MHz, Vi=0.5 Vp-p	−1	−0.5		dB
		Pr	490	mW	G_{EH}	$V_{12\text{-}4}$=12 V, f_1=10 kHz, f_2=2 MHz, Vi=0.3 Vp-p	7.5	8	8.5	dB
		Topr	−10~70	°C	G_{EL}	$V_{12\text{-}4}$=12 V, f=10 kHz, Vi=0.3 Vp-p	8	10	12	dB
		Tstg	−40~150	°C	D_{AGC}	$V_{12\text{-}4}$=12 V, f=10 kHz, Vi=0.5 Vp-p		0.5	1.5	%

AGC CIRCUIT

This circuit keeps picture always at a fixed level even when the video input level is excessively high or low.

VIDEO & PRE-EMPHASIS CIRCUIT

For a FM system, noise increases at high frequency when the video signal is FM modulated. To prevent the noise from increasing, this circuit is used to previously emphasize the high frequency part of the FM signal while supplying video signal.

CLAMP CIRCUIT

When the input video signal level varies, the average level of DC also varies. But the pre-emphasis circuit controls the transfer of the DC part, and the video signal varies according as zero level. As a result, the sync-tip level varies as shown in Fig. 3(2). As the sync-tip level varies, it becomes difficult to set the reference frequency when driving the next FM modulator. In order to solve this problem, the clamp circuit is provided for fixing the sync-tip at a certain level as shown in Fig. 3(1).

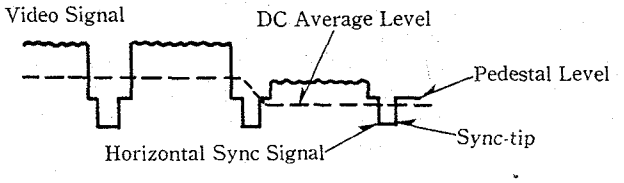


Fig. 3(1)

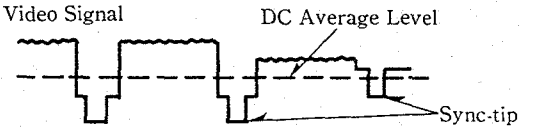


Fig. 3(2)

WHITE CLIP CIRCUIT

Video signal enters the FM modulator and is emphasized. In the case of a high contrast between black and white, it becomes excessively modulated video signal in white portion. When the modulator is driven in this state, frequency deviates excessively at the white level part, resulting in over-modulation. If a video recording is made in an extremely over-modulated condition, the frequency exceeds the limit of recording and playback ability with the video head, and the white-level signal in playback is distorted or playback becomes impracticable. In order to prevent the above-stated trouble, a white clip circuit serves to clip the white level.

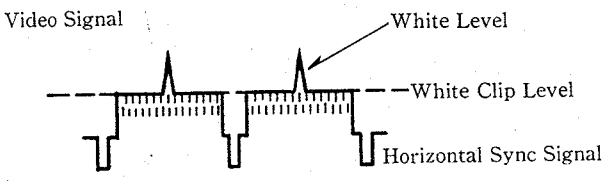


Fig. 4

FM MODULATOR: Tr303, 304

The FM modulator is built up with the non-stable multivibrator in which the oscillation frequency is converted by regulating the base voltage. Amplitude of frequency modulation should be adjusted for the range between the sync-tip and white peak signals. The modulator is self-oscillated by 3.7 MHz when no input signal is fed to the circuit.

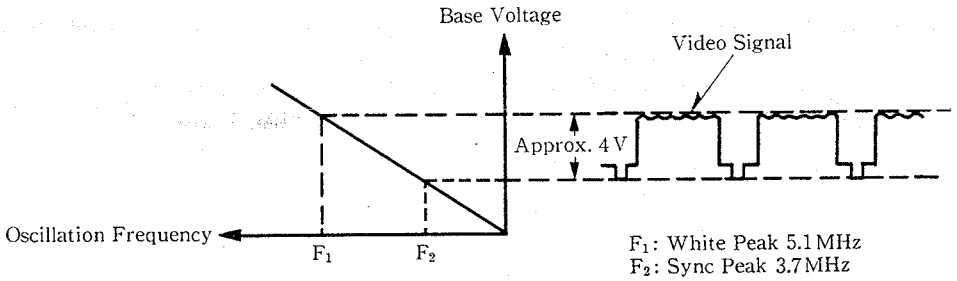


Fig. 5

LIMITER: IC302 (AN304)

The video FM signals are routed to the limiter (IC302) before they are demodulated because they include various noises caused by level fluctuations due to unstable head-to-tape contact, unwanted signals or an incorrectly reproduced side-band. The limiter serves to reduce undesirable level fluctuations.

AN304 (VTR Video FM Limiter)

Type No.	Application	Maximum Ratings (Ta=25°C)			Electrical Characteristics (Ta=25°C)					
		Item	Rating	Unit	Item	Condition	Min.	Typ.	Max.	Unit
AN304	VTR Video FM Limiter	$V_{12\text{-}4}$	15.6	V	I_{12}	$V_{12\text{-}4}$=12 V		25		mA
		$V_{7\text{-}5}$	+12, −	V	$V_{8(P\text{-}P)}$	Pin ⑧ 1 KΩ GND	1	1.2		V
		$V_{7\text{-}6}$	+30, −	V	G_V	$V_{12\text{-}4}$=12 V, f=4 MHz, Vi=0.14 mVp-p	1			Vp-p
		$V_{6\text{-}5}$	−, −5	V	Vo(f)/Vo(2f)	$V_{12\text{-}4}$=12 V, f=4 MHz, Vi=100 mVp-p	40			dB
		I_7	+20, −	mA	Vo(f)/Vo(2f)	$V_{12\text{-}4}$=12 V, f=4 MHz, Vi=10 mVp-p	40			dB
		I_8	−, −5	mA	Vo(f)/Vo(2f)	$V_{12\text{-}4}$=9 V, f=4 MHz, Vi=10 mVp-p	40			dB
		Itot	45	mA	Vo(f)/Vo(2f)	$V_{12\text{-}4}$=12 V, f=4 MHz, Vi=100 mVp-p, Ta=70°C	34			dB
		P_T	490	mW	Vo(f)/Vo(2f)	$V_{12\text{-}4}$=12 V, f=4 MHz, Vi=100 mVp-p, Ta=−20°C	34			dB
		$P_{T(T30)}$	50	mW	h_{EE}	$V_{12\text{-}4}$=12 V	40		200	dB
		Topr	−20~70	°C						

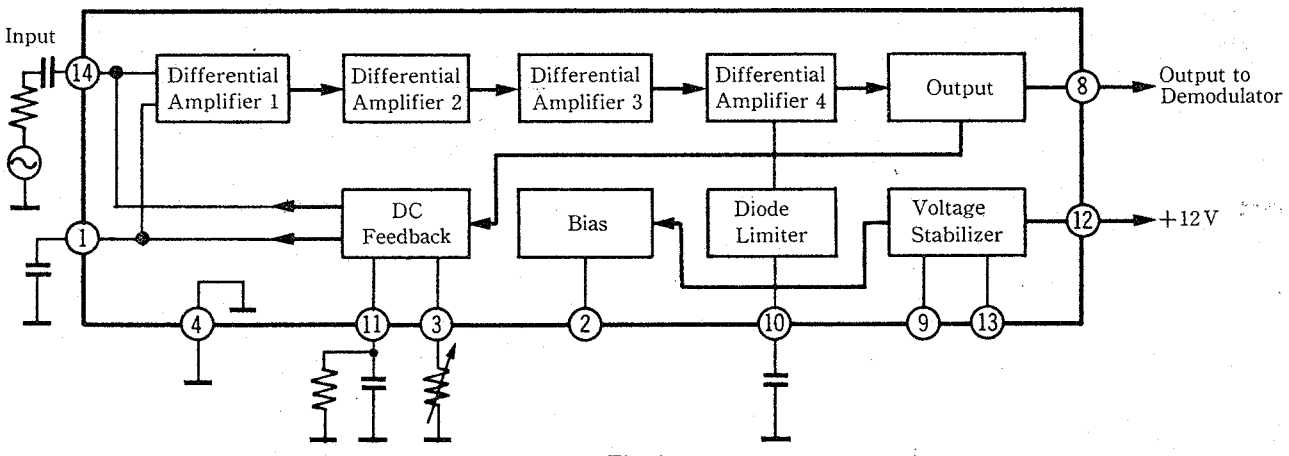


Fig. 6

FM DEMODULATOR: D301, 302, Tr306

The FM demodulator is pulse differential utilizing the square wave signal fed out of the limiter output (See Fig. 7). The waveform ① shows the output signal from the limiter circuit, which is differentiated to form the negative and positive pulse wave ② of stable amplitude.

Rectifying the wave signals into the dilatational pulses as shown in ③, the signal is demodulated into the waveform as shown in ④ by tracing average level of each pulse via low-pass filter (differential circuit). The symmetric waveform must be obtained to minimize the carrier leakage, which might be reduced by the sharpened range of the low-pass filter.

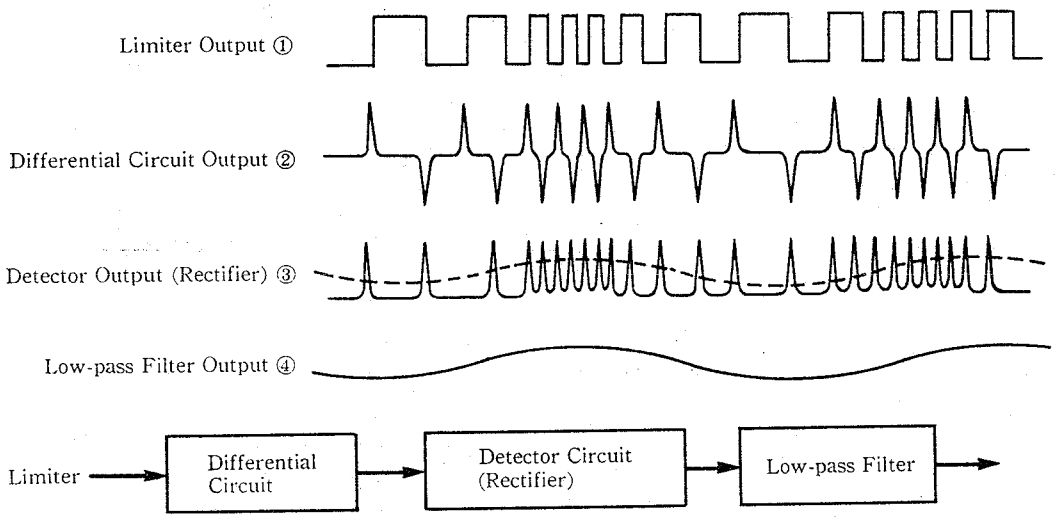


Fig. 7

NOISE CANCELLER (Tr307~Tr309)

This is designed for obtaining the better S/N video picture by cancelling the noise containing in the signal from demodulator. The noise itself is proportional to the increase of frequency so that if the high frequency is eliminated as much as possible, the video S/N is improved.

At first, the high frequency portion is taken out by the high pass filter, and only noise portion is taken out by the limiter. Then, the phase of this noise portion is reversed, and is mixed with the former signal with noise. Therefore, the noise is cancelled.

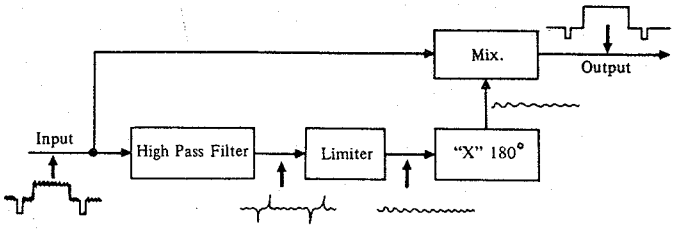


Fig. 8

Control System

This NV-3085 employs Electronic Head Switching and Servo-drive Rectangular-designed Pulley operation. The changeover of the video heads (H501, 502) is accomplished by an electronic switching system which bases on a pulse from the detection heads (H201, 202).

Our VTR uses the rotary head system so that it is necessary to use the servo control circuit for getting the stable recorded track scanning. By this system, we can get good S/N ratio and stable picture.

ELECTRONIC HEAD SWITCHING

* Pulses which have phase differences of 180° are precisely generated in each detection head (H201, 202) by the rotation of a bar magnet (25 rps).

* H201 has a 180° phase relationship to H202 (180° azimuth adjustment).

DETECTION HEAD

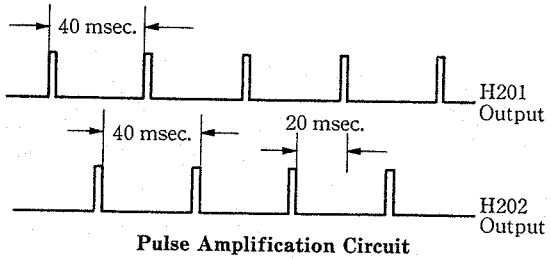
The amplified pulse signal (Tr201, 202) triggers each bistable multivibrator (Tr203, 204) whose output is then applied to the switching base (Tr503, 506).

A ~25 Hz (40 m/sec.) pulse is generated by each detection head. Because the phase relationship between H201 and H202 is 180°, a pulse is generated per a half cycle (20 m/sec.) of the bar magnet rotation.

The head bar to which 2 video heads are attached is fixed on the upper shaft of the rotary head motor, and rotates clockwise accurately at 1,500 rpm in the drum. At the time, the video head mounted at the head bar end is slightly projected from the gap located in nearly the middle of the drum height. It comes in contact with the tape and imparts or receives signals to or from the tape. The drum surface should therefore be completely kept from contact with hand or solid material such as a screwdriver while the rotary head motor is rotating.

Output from the 2 video heads is supplied to the head amplifier through the slip ring in the middle of the head bar and the brush.

The running tape is accurately controlled, by tape guide posts, and tape supporters around the tape guide (drum). The tape supporter position at this time is very consequent in view of interchangeability and so the position should not be modified.

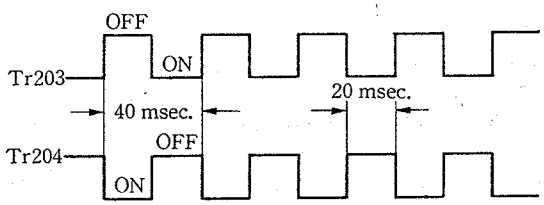


Pulse Amplification Circuit

Fig. 9

BISTABLE MULTIVIBRATOR

The bistable multivibrator acts as a count-down circuit, if either Tr203 or Tr204 is switching on, the other is in a stable off mode. Therefore, if either transistor is off, the other turns on. Due to this multivibrator action, a single output pulse is generated by two input trigger pulses.



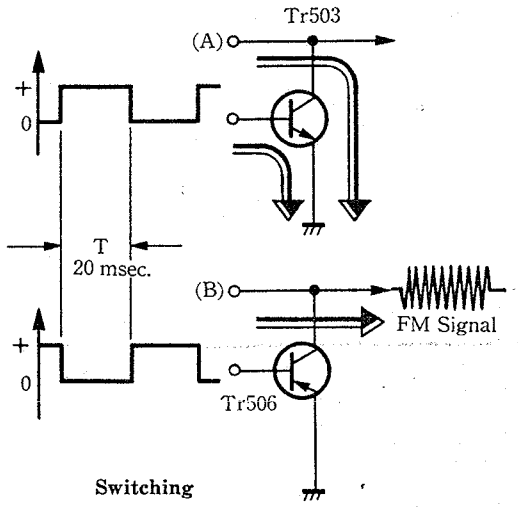
Bistable Multivibrator Circuit

Fig. 10

SWITCHING CIRCUIT

While the video head (B) is moving on the tape, video head (A) does not read the recorded signals on the tape, and if either output of the bistable multivibrator (whose collector voltage is approx. 12 V in the OFF mode) is applied to the base of Tr503 while the video head (A) rotates per a half cycle (20 m/sec.), the collector and the emitter of Tr503 are short-circuited, whose output will be non-signal with no noise.

While the video head (B) reads FM signals on the tape (for 20 m/sec.), one of the outputs of the bistable multivibrator (whose collector voltage is approx. 0 V in the ON mode) is applied to the base of switching transistor Tr506. For this reason, the collector and emitter of Tr506 are effectively disconnected and allow the FM signal to pass through. At the moment when video head (A) and (B) are changed over, the base voltage on the switch transistor changes correspondingly.



Switching

Fig. 11

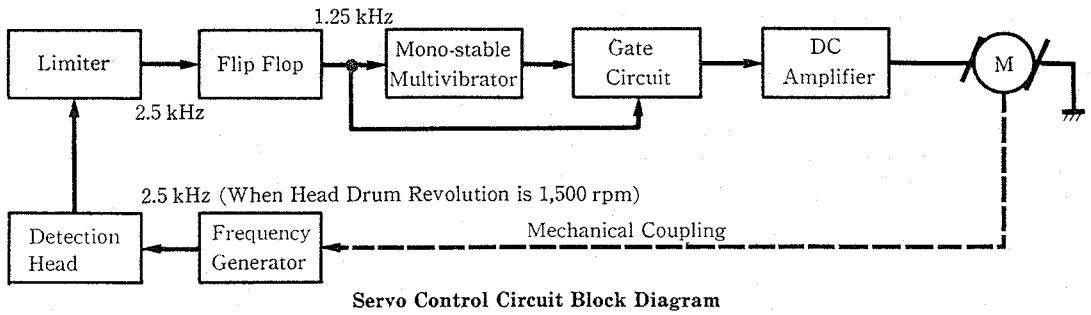
HEAD DRUM/CAPSTAN SERVO CONTROL

Two motor servo mechanism (one motor for head drum drive, the other for tape drive) has been adopted in tape speed and head drum revolution control of NV-3085. This system controls the head drum and tape speed extremely exactly to gain stable and high quality picture and perfect tape interchangeability.

It is required to control the motor rotation phase for precise head drum and tape drive on playback mode. Therefore, the DC motors are controlled with both speed and phase control.

Speed Control System

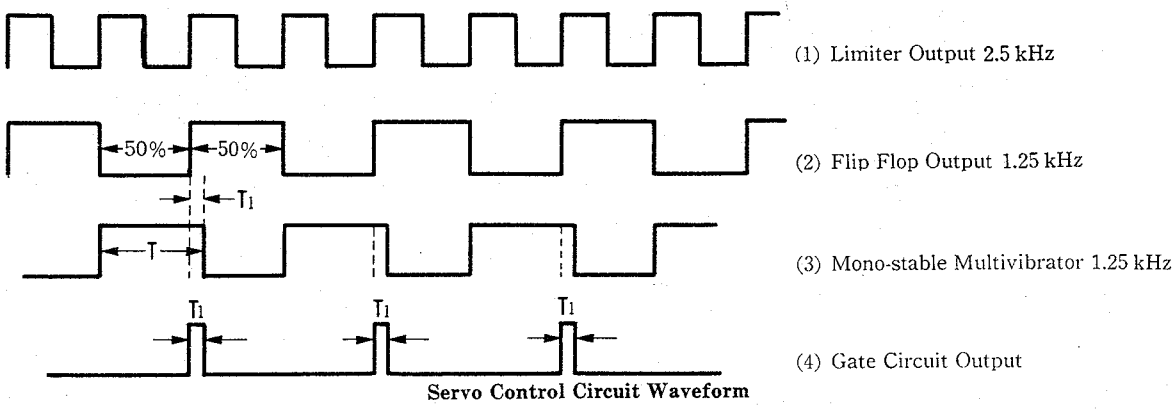
The frequency generator directly connected or coupled by belt with motor shaft generates the frequency (2.5 kHz, at 1,500 rpm) proportionally with motor rotation. The generated frequency is detected with the detection heads and the motor is driven by voltage of detection wave. And so, the motor rotation is controlled by keeping the oscillation frequency in a certain value.



Servo Control Circuit Block Diagram

Fig. 12

The signal voltage generated in the frequency generator, after passing through the limiter circuit, is shaped into rectangular waveform (Fig. 13(1)), and then it is fed into the flip flop circuit to be divided into one half (Fig. 13(2)). The output pulse width of the flip flop circuit should always be fifty-fifty per cent (duty cycle) without regard to its frequency. The downward transient of the flip flop triggers the next stage monostable multivibrator so that the pulse which is delayed for the interval determined by the time constant of C.R. may be fed out. The outputs of the flip flop and the monostable multivibrator is passed through the plus gate (Fig. 13(3)) so that the output of its gate circuit becomes only phase difference of two pulses (Fig. 13(4)). Its gate output is converted into direct current, which controls the motor speed. As the speed control system operates, so phase control system operates.



Servo Control Circuit Waveform

Fig. 13

In the speed control circuit and the phase control circuit, the reference signal fed into these circuits and the signal to be controlled are different on recording mode and on playback mode as follows.

	Mode Selector	Mode	Reference Signal	Signal to be Controlled	Vertical Sync Out
Head drum control	TV	Recording	Input video sync signal	Head drum detection signal	
		Playback	Internal 50 Hz reference signal		Internal 50 Hz reference signal
	Camera	Recording	Input video sync signal		
		Playback	Internal 50 Hz reference signal		Vertical sync signal from P.B. video signal
Tape speed control	TV	Recording	Input video sync signal	Capstan motor detection signal	
		Playback	Internal 50 Hz reference signal	Recorded control signal on tape	
	Camera	Recording	Input video sync signal	Capstan motor detection signal	
		Playback	Internal 50 Hz reference signal	Recorded control signal on tape	

FREQUENCY GENERATOR (FG)

Each frequency generator, which is coupled directly with the capstan motor shaft or driven through the medium of head belt, generates frequency proportionate to the number of rotations of the motor. The photo shows the components for frequency generation.

The following describes how frequency is generated. Fig. 14 illustrates constructions of Capstan FG and Control Disc (1), and Capstan Detection Head and Control Disc (2).

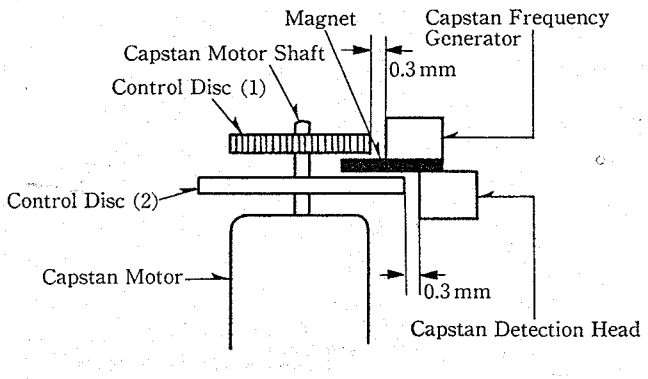


Fig. 14

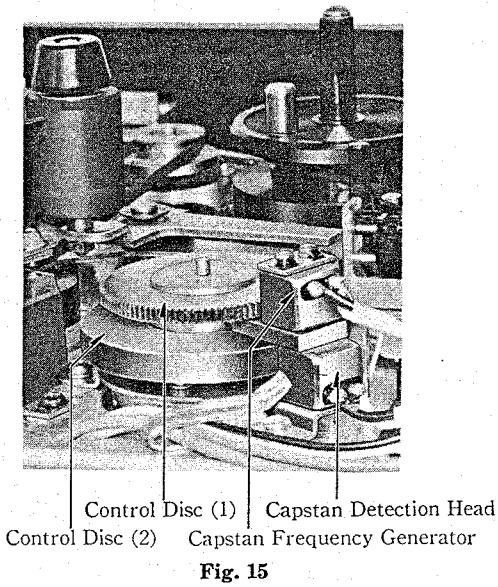


Fig. 15

Magnetic force lines start at pole S, proceed to pole N, and after reaching pole N, they get radiated outward of the magnet as shown in Fig. 16. Drawing loops, they reach pole S, thus each line forming a closed loop.

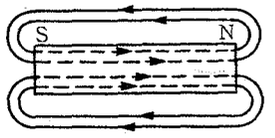


Fig. 16 (1)

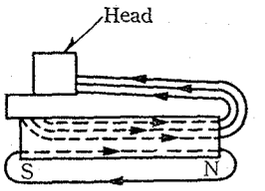


Fig. 16 (2)

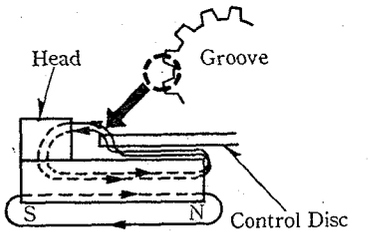


Fig. 16 (3)

1. Magnetic force lines go from pole N toward pole S (See Fig. 16 (1)).
2. Adding a head to pole S causes more magnetic force lines (coming from pole N) to run into the magnet (See Fig. 16 (2)).
3. Adding a control disc in the state of (2) causes magnetic force lines to go from pole N and, passing through the groove of the control disc, run into the head (See Fig. 16 (3)).
4. Fig. 17(1) is a top view of Fig. 16(3), and shows the section of the control disc generating frequency. When the clearance between the control disc and the head is 0.3 mm (① in the drawing), the magnetic resistance is small and the magnetic density high.
   In the state of ② shown in the drawing, the magnetic resistance increases and the magnetic density decreases. As viewed on the waveform, the level is high where the magnetic density is high and the level is low where the magnetic density is low.
   Frequency can be generated as mentioned above. Provided that control disc ① has 100 pitchs and ② has 1 pitch and the speed is 1,500 rpm (25 rps), the frequency generator generates frequency proportionate to the motor speed bearing the following relationships:

   Frequency by control disc ①
   Frequency by 1 rotation of motor=
   100 (pitchs) × 1 (rotation) = 100 Hz
   Frequency by rotation of motor for 1 sec.=
   100 (pitchs) × 25 (rotations) = 2.5 kHz

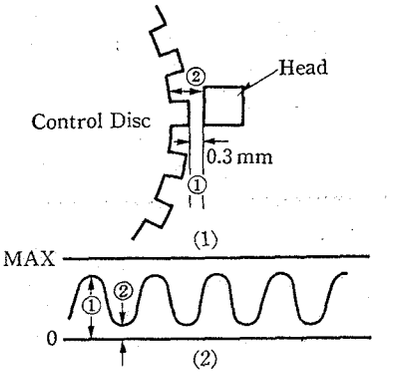


Fig. 17

Frequency by control disc ②
Frequency by 1 rotation of motor=
1 (pitch) × 1 (rotation) = 1 Hz
Frequency by rotation of motor for 1 sec.=
1 (pitch) × 25 (rotations) = 25 Hz

The 2.5 kHz becomes speed control signal for constant-speed rotation of the motor. As mentioned above, rotations of control discs ① and ② provide detection of capstan motor rotation, serving for both speed control and phase control. The same applies to the head drum motor, where 2.5 kHz of reference signal is fed out.

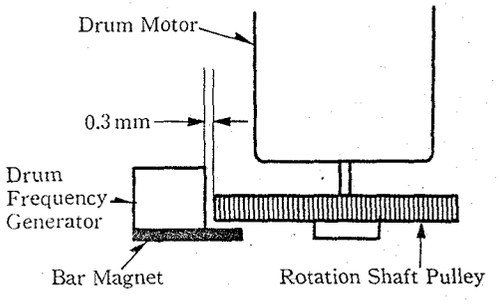


Fig. 18

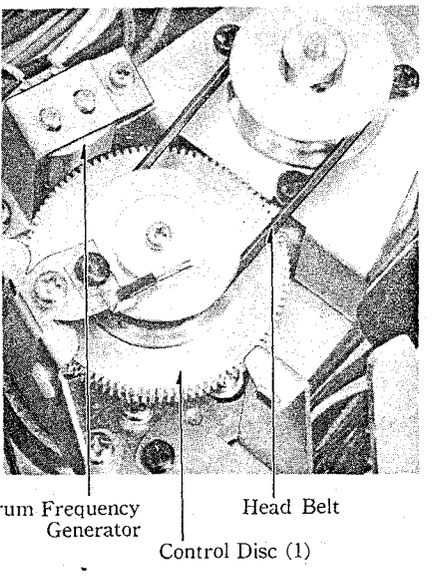


Fig. 19

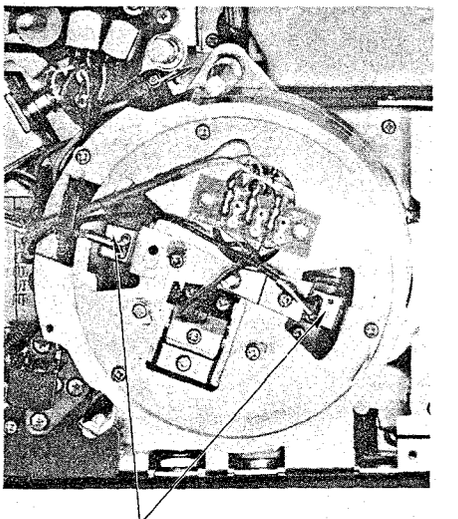


Fig. 20

(EXPLANATION OF CIRCUIT)

Head Drum Control

Operation During Recording

As reference signal for the control circuit, the vertical sync signal is utilized. For this reason, video signal supplied from terminal ① of the camera connector enters terminal ⑯ of IC201 on the control circuit, and passing through the vertical sync signal separation circuit and the 1/2 frequency dividing circuit, it is fed out as 25 Hz asymmetric square waveform from terminal ⑨ and recorded as the control signal by the control head.

The 25 Hz asymmetric square wave supplied from terminal ⑩ is differentiated at C227 and R228, and only the negative portion is fed out at D206 and supplied to the mono-stable multivibrator (Tr206, 207). The video record phase control circuit comprising Tr206 and Tr207 controls the rotary head phase during video recording, so that two heads are changed over at every field immediately before vertical sync signal, thereby keeping out switching noise.

This signal goes through the next amplifier (Tr208) and is supplied to the phase comparison circuit (Tr204), to which trapezoidal wave is supplied from the trapezoidal wave conversion circuit (Tr203). The slanting portion of this trapezoidal wave is sampled by the pulse applied to the base of Tr204, and the error voltage (phase change→voltage change) is fed out. To change impedance, the error voltage is let through the drain follower. It is then supplied, through the equalizer, to the mono-stable multivibrator (Tr211, 212). Voltage generated by drum FG goes through the limiter circuit, is shaped to be a rectangular wave, supplied to the flip flop (IC202) and frequency-divided into 1/2.

This signal triggers the next mono-stable multivibrator (Tr211, 212), the output and the flip flop output are led to the gate circuit (D207, 209), and the gate output of the phase portion is fed out. The gate output is converted into direct current by the inergration circuit (R259, C239), let to the motor drive circuit (Tr215, 216) and controls the drum motor.

Operation During Playback

During playback the signal oscillated by the LC oscillator (Tr231) of the control circuit is utilized as reference signal. The signal of LC oscillator is supplied to IC201 by switch (S201-6). For explanation of the circuit, refer to that of video recording.

Capstan Control

Operation During Recording

For reference signal, the vertical sync signal (of video signal) is utilized like in the case of head drum control. Therefore, the video signal supplied from terminal ① of the camera connector enters terminal ⑯ of IC201 on the control circuit, and passing through the vertical sync separation circuit and the 1/2 frequency dividing circuit, it is fed out as 25 Hz asymmetric square wave from terminal ⑩. This signal is differentiated at C245 and R264; only the positive portion is fed out by D213, supplied to the mono-stable multivibrator (Tr217, 218) and converted into a trapezoidal wave.

On the other hand, 25 Hz pulse indicating the capstan rotation phase is fed out from the capstan rotation phase detecting head (H204), amplified at Tr219 and Tr220, and then supplied to the phase comparison circuit (Tr222).

To the collector of Tr222 of this phase comparison circuit, the trapezoidal wave is supplied from the mono-stable multivibrator. The sloping portion of the trapezoidal wave is sampled by the 25 Hz pulse applied to the base of Tr222, and the error voltage (phase variation →voltage variation) is fed out.

The detected error voltage, after being amplified at Tr223, is fed back and led to the mono-stable multivibrator (Tr217, 218). This feedback is provided in order to improve servo-loop stability and responsibility which are particularly necessary for the control circuit. The servo pull-in time and the time constant are judged by the mono-stable multivibrator.

The voltage generated by capstan FG (H203) goes through the limiter circuit, is shaped to a rectangular wave, supplied to the flip flop of IC203, and frequency-divided into 1/2. This signal triggers the mono-stable multivibrator (Tr226, 227). The output and the flip flop output are led to the gate circuit (D215, 216), and an output equivalent to the phase difference is fed out. The gate output is converted in to DC by the integration circuit (R2101, C259), led to the motor drive circuit (Tr230), and used for controlling the capstan motor.

Operation During Playback

During playback the signal oscillated by the LC oscillator (Tr231) of the control circuit is used as reference signal, instead of vertical sync signal. The tracking circuit (IC201) regulates the head rotation phase, so controlling that video heads may pass on recorded tracks properly during playback. Because tracking has to be adjusted for interchangeability, etc., the tracking control is provided.

This output is fed out from terminal ⑧ of IC201, and passing through Tr219 and Tr220, it is supplied to the phase comparison circuit (Tr 222). To the collector of Tr222, the trapezoidal wave is supplied from the mono-stable multivibrator (Tr217, 218); the slanting portion of this trapezoidal wave is sampled by the pulse applied to the base of Tr222, and the error voltage (phase variation→voltage variation) is fed out.

Like in the case of video recording, it is then compared (in phase) to the 25 Hz pulse supplied from the capstan rotation phase detecting head (H204) in order to control the capstan motor.

Type No.	Application	Maximum Ratings (Ta=25°C)			Electrical Characteristics (Ta=25°C)					
		Item	Rating	Unit	Item	Condition	Min.	Typ.	Max.	Unit
AN301	VTR servo control signal process circuit	V_{1-4}	15.6	V	I_1	V_1=12V	18.5	23.3	28	mA
		I_1	45	mA	G_{V15-16}	V_{16}=1Vp-p	3	3.5	4	
		V_{7-4}	−12	V	Vosync13	V_{16}=1Vp-p	8.9			Vp-p
		V_{11-4}	−12	V	$V_{IN}16$	V_{16}=Pulse	4	7.6	15	mVp-p
		I_8	−10	mA	$T_{WR}9$	V_{16}=1Vp-p	25	27.5	30	msec
		I_9	−10	mA	G_{V2-3}	V_3=5mVp-p	90	130	180	
		I_{13}	−10.3	mA	$V_{IN}3$	V_3=Pulse	0.6	0.9	1.5	mVp-p
		Ptot	490	mW	$T_{WP}8$	V_3=5mVp-p	26	29	31	msec
		Topr	−10~60	°C						
		Tstg	−40~150	°C						

AN301

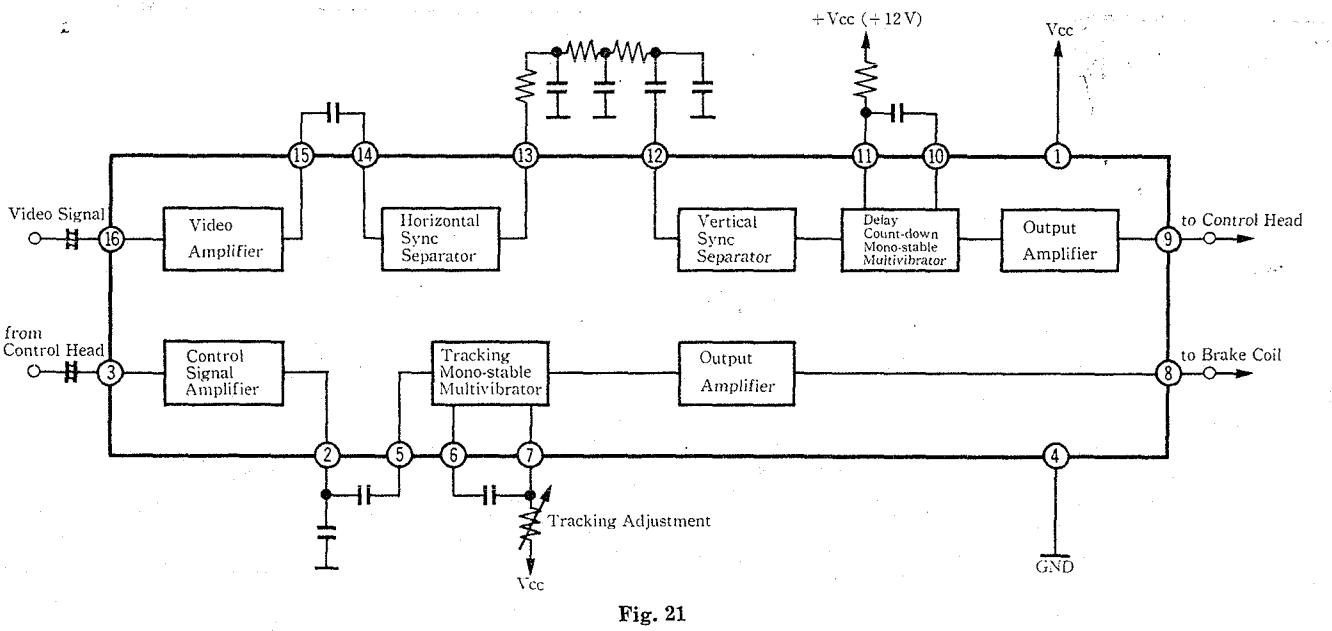


Fig. 21

Type No.	Function	Maximum Ratings (Ta=25°C)			Electrical Characteristics (Ta=25°C)					
		Item	Rating	Unit	Item	Condition	Min.	Typ.	Max.	Unit
MN115 MN117 MN116 MN118	1/2, 1/525 1/2, 1/625 Frequency divider	V_{DD}	−15	V	I_{DD}	V_{DD}=12V			−10	mA
		V_{IN}	−15	V	V_{IH}	V_{DD}=−12V			−2	V
		V_F	0.3	V	V_{IL}	V_{DD}=−12V	−6			V
		P_T	250	mW	V_{VOH}	V_{DD}=−12V R_L=10KΩ			−1	V
		Topr	−30~70	°C	V_{VOL}	V_{DD}=−12V R_L=10KΩ	−9			V
		Tstg	−40~125	°C	V_{HOH}	V_{DD}=−12V R_L=10KΩ			1	V
					V_{HOL}	V_{DD}=−12V R_L=10KΩ	−9			V

MN116

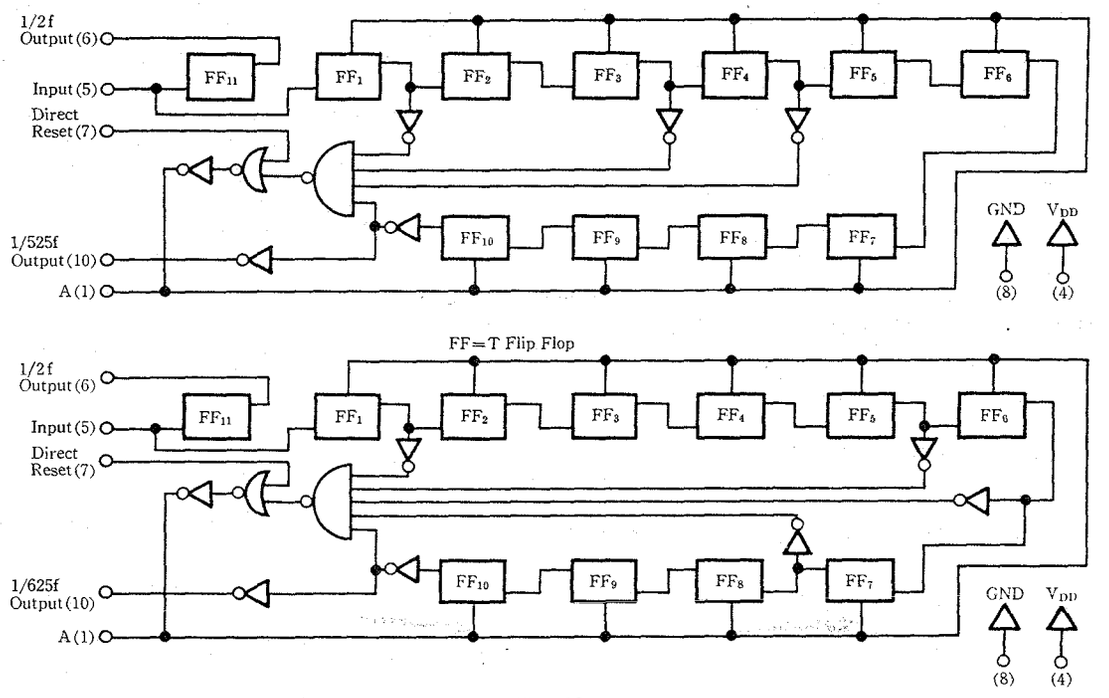


Fig. 22

Type No.	Function	Maximum Ratings (Ta=25°C)			Electrical Characteristics (Ta=25°C)					
		Item	Rating	Unit	Item	Vcc (V)	Condition	Min.	Max	Unit
DN1946	Quadruple 2 input NAND gate	Vcc	−0.5~8	V	V_{OL}	4.5	V_{IH}=1.9 V, I_O=12 mA		0.4	V
		V_I	−1.5~5.5	V	V_{OH}		V_{IL}=1.1 V, I_O=−0.12 mA	2.6		V
		V_O	6	V	I_{IL}	5.5	V_{IH}=4 V, V_I=0		−1.6	mA
		I_I	−10~1	mA	I_{IH}		V_{IL}=0, V_I=4 V		2	μA
		I_O	30	mA	I_{OS}		V_{IL}=0, V_O=0		−1.34	mA
		P_T	250	mW	I_{OH}	4.5	V_{IL}=0, V_O=4.5 V		50	μA
		Topr	0~75	°C	I_{CCL}	5			13	mA
		Tstg	−65~150	°C	I_{CCH}	8	V_{IL}=0		11	mA
					tpd_L	5	R=400Ω, C=50 pF	10	30	nS
					tpd_H		R=3.9KΩ, C=30 pF	25	80	nS
					P_T			34 (typ.)		mW
					Fo				8	

DN1946

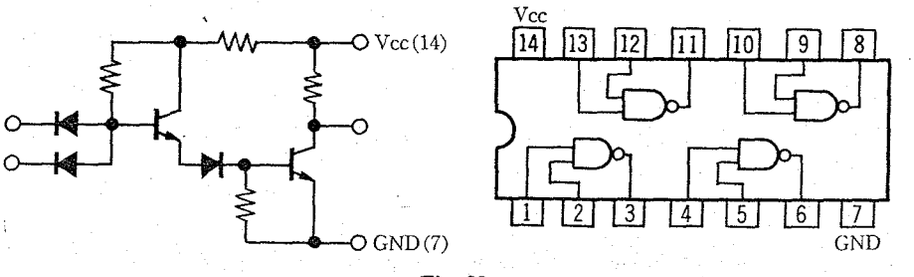


Fig. 23

Audio Circuit

Because the inputs supplied from AUDIO IN and MIC IN are at low level, they are amplified at the 1st pre-amplifier (Tr401) and then conveyed to the 2nd pre-amplifier (IC401). This 2nd pre-amplifier circuit is connected with the playback low-frequency compensation circuit to operate as an equalizing amplifier circuit. Output from the 2nd preamplifier is amplified at the output amplifier circuit (Tr403, 404) and then fed to the monitor.

To control the input level during recording, the signal from the output amplifier circuit is let through both-wave rectification at the detection circuit (Tr405, D401, 402) and then the DC output is fed to the AGC circuit (Tr402).

In the case of playback, playback audio signal is supplied from the audio head to the circuit. The level of this playback audio signal can be adjusted by R410 (20KΩ, Playback Gain Adjustment).

For audio recording, about 70 kHz is oscillated by the high-frequency bias oscillator (Tr406, 407, T402) and is then supplied to the audio head. At the same time, output signal supplied from the output amplifier (Tr403, 404) is superposed on bias, and passing through the audio head, audio signal is recorded on the tape.

This oscillator simultaneously supplies erase current to the audio erase head and the full-width erase head, too.

CONSTRUCTION OF IC401 (BA301)

Construction Monothiric Linear Integrated Circuit
Applications Low Noise Preamplifier

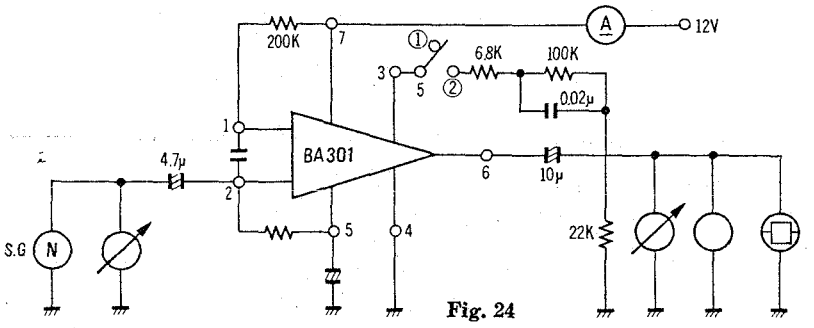


Fig. 24

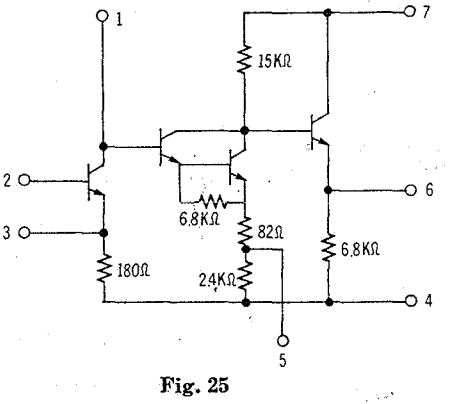


Fig. 25

Absolute Maximum Ratings Ta=25°C

Item	Mark	Standard Value	Unit
Maximum Apply Voltage	Vcc max	20	V
Maximum Loss	Pd max	150	mW
Operating Temperature	Topt	−25~75	°C
	Tstg	−55~125	°C

Electrical Characteristics (Vcc=12 V Ta=25°C)

Item	Mark	Condition	Min	Typ	Max	Unit
Circuit Current	Icc	Vin=0	0.9	1.5	2.3	mA
Loop Gain (Opened)	Gvo	Vin=−80 dBm, f 1 kHz	70	79	90	dB
Maximum Output Voltage	Vcm	f=1 kHz	2.0	2.6	—	V
Distortion Ratio	T.H.D	f=1 kHz, Vout 0.5 V	—	0.06	0.15	%
Noise Voltage	Vn	Bw 30 Hz~20 kHz	—	60	100	μV
Input Impedance	Zin		100	120	—	KΩ
Output Impedance	Zout		—	5	50	Ω

Power Supply Circuit

The power circuit includes an under-cut circuit, a 9 V power source and a battery meter indication circuit.

UNDER-CUT CIRCUIT

Used for cutting the power source when the voltage of the built-in batteries become lower than the specified level (10.5 V).

Providing that the power switch is set at ON and the voltage is higher than the specified level, Tr101 and Tr102 are closed (ON). Accordingly Tr103 gets closed (ON) to energize relay K101.

+12 V is applied to ② of the power circuit, supplied and through R112 (5.6KΩ) to the base of Tr104 which is then closed (ON). At the same time Tr105 is also closed (ON). Voltage of the emitter of Tr105 is about +12 V.

Being divided by R116, 118 and R119, the voltage is applied to the base of Tr106, closing the transistor (ON). As the result, the voltage of the base of Tr104 becomes lower and finally no voltage is obtained at the emitter of Tr105. The same as above applies to the 9 V power source (motor system), too.

ELECTRICAL ADJUSTMENT PROCEDURE

TEST EQUIPMENT

1. Dual Trace Oscilloscope
   Frequency Range: DC to 10 MHz ±3 dB
   Voltage Range: 0.005~5 V/DIV
   Probe: 10:1
2. Frequency Counter
   Measurement Frequency: 3 Hz~5 MHz
3. Vacuum Tube Volt Meter (VTVM)
4. Signal Generator
   Stair-case Signal Generator, Sweep Generator,
   Sine-wave Generator: 100 Hz~10 MHz
5. Ammeter
   Range: 1 mA~10 A
6. Power Regulator
   Output: DC 4 A, 0~20 V
7. Reference Tape
   Standard Reference Tape, Part No. VFM4100/4121.
8. TV/Monitor Receiver
9. Portable Camera WV-3085E
10. AC Adaptor NV-B40E
11. 8-10 P VTR-TV Monitor Connection Cable VJA47A
12. 1Ω, 1/4 W Resistor, 10Ω 1/4 W, ±5% Resistor

Power Supply Circuit

1. Voltage Regulator Circuit Adjustment

* Check Point: TP102
* Adjustment Point: R118

1. Place the unit in recording mode, and set external power source voltage at +12 V.
2. Adjust R118 so that voltage of TP102 becomes +9 V.
3. When EXIT power source voltage is varied from +11 V to +15 V, make sure that voltage of TP102 is 9±0.2 V.

2. Battery Meter Indication Adjustment

* Check Point: Battery Meter
* Adjustment Point: R114

1. Place the unit in recording mode.
2. Set the external power source voltage to +11 V.
3. Adjust R114 so that the battery meter indication becomes in center of orange color portion.

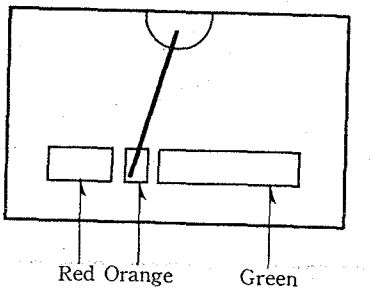


Fig. 1

3. Under-cut Circuit Adjustment

* Check Point: Relay (K101)
* Adjustment Point: R101

1. Connect the camera to J301 (10 P connector).
2. Connect the external power source and DC volt meter ot both ends of battery terminal as shown in Fig 2, and set TV/CAMERA select switch to CAMERA.
3. Turn R101 fully clockwise, make sure that the voltage of volt meter becomes 11~15 V.
4. Place the unit in recording mode.
5. Set the external power source voltage to +10.5 V.
6. Turn R101 counterclockwise to set just after the relay (K101) becomes OFF.

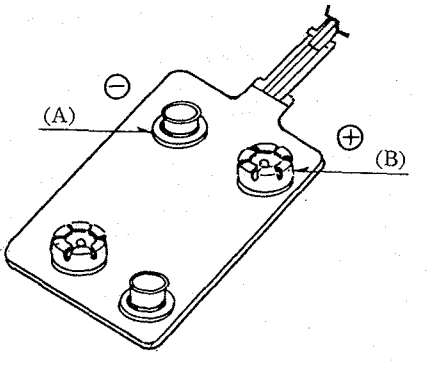


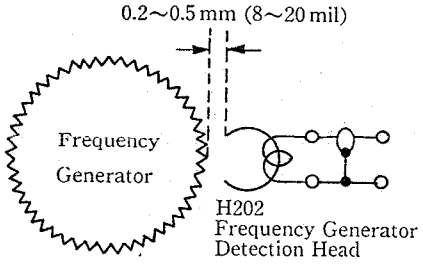
Fig. 2

HEAD DRUM CONTROL CIRCUIT

1. Space Between the Frequency Generator & Detection Head

* Check Point: Detection Head (H202) Output Terminal
* Adjustment Point: Detection Head (H202)

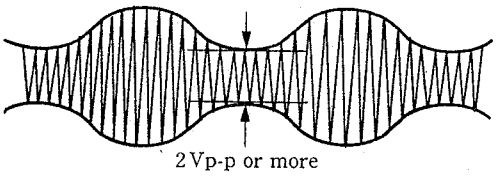
1. Adjust the gap between the frequency generator and detection head for 8~20 mil (0.2~0.5 mm) (See Fig. 3).



Frequency Generator Detection Head Gap

Fig. 3

2. Turn the power switch ON and rotate the drum motor.
3. Connect an oscilloscope to the detection head terminal.
4. Make sure that the waveform of detection head terminal becomes as shown in Fig. 4.



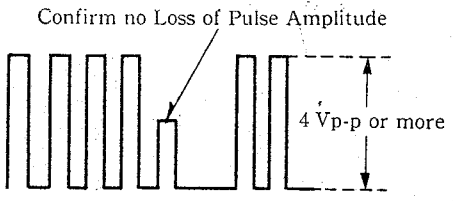
Detection Head H202 Output

Fig. 4

2. Speed Control Limiter

* Check Point: TP207

1. Connect an oscilloscope to TP207 and make sure that the complete waveform without any peak losses is fed out from the frequency generator.



TP207 Frequency Generator Output

Fig. 5

3. Speed Control Flip Flop

* Check Point: TP208

1. Connect an oscilloscope to TP208 and confirm the waveform as shown in Fig. 6.

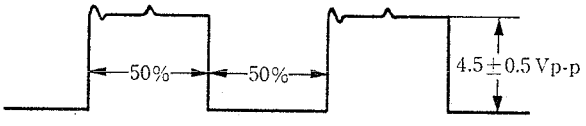


Fig. 6

4. Speed Control Monostable Multivibrator

* Check Point: TP207
* Adjustment Point: R252

1. Connect a frequency counter to TP207.
2. Adjust R252 so that the frequency of TP207 becomes 2.5 kHz.

5. Speed Control Duty

* Check Point: TP205

1. Make sure that the waveform of TP209 becomes as shown in Fig. 7.

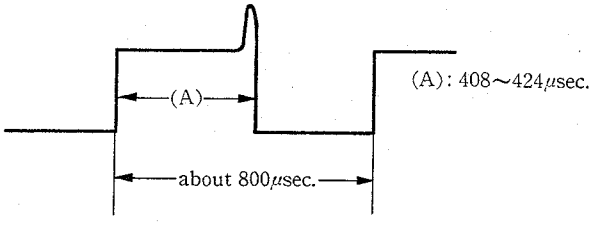


Fig. 7

6. Drum Motor Current Waveform

* Check Point: L202

1. Cut between output of L202 (S/N coil) and ground.
2. Insert 1Ω resistor, and connect an oscilloscope to both ends of 1Ω resistor.
3. Make sure that the waveform becomes as shown in Fig. 8.
4. Next, insert an ammeter.
5. Connect a frequency counter to TP207.
6. Adjust R252 so that the frequency of TP207 becomes 2.5 kHz, and make sure that the indication of ammeter becomes 250 mA or less (at stop mode).

Fig. 8

7. Output of Drum Detection Head

* Check Point: Detection Head Output Terminal (H201-1, 201-2)
* Adjustment Point: Detection Head

1. Adjust the gap between the bar magnet and detection head respectively so that both phase detection head outputs show the waveform of Fig. 9.
2. Make sure that the waveform of collector Tr224, Tr225 become as shown in Fig. 10.

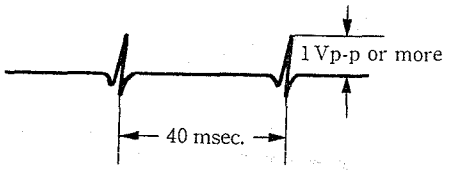


Fig. 9

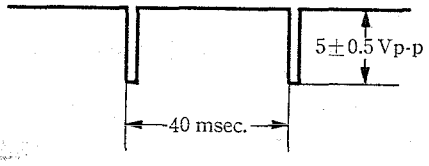


Fig. 10

8. Flip Flop for Head-amp Switching

* Check Point: Terminal ⑧ and ⑩ of IC203

1. Connect an oscilloscope to terminal ⑧ and ⑩ of IC203.
2. Make sure that the waveform becomes as shown in Fig. 11.

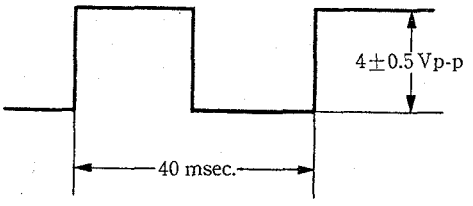


Fig. 11

9. Vertical Sync Separator Circuit

* Check Point: TP202

1. Set TV/CAMERA select switch to TV.
2. Supply the video signal to ①, ② of J301 (10P connector).
3. Place the unit in recording mode, and connect an oscilloscope to TP202.
4. Make sure that the waveform of TP202 becomes as shown in Fig. 12.

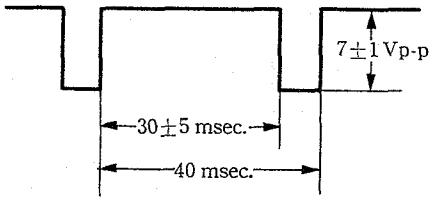


Fig. 12

10. Rectangular Wave of Phase Comparison

* Check Point: TP204

1. Connect an oscilloscope to TP204.
2. Make sure that the waveform of TP204 becomes as shown in Fig. 13.

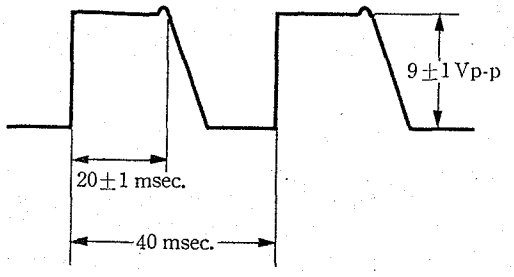


Fig. 13

11. Gate Wave

* Check Point: TP206

1. Connect an oscilloscope to TP206.
2. Make sure that the waveform of TP206 becomes as shown in Fig. 14.

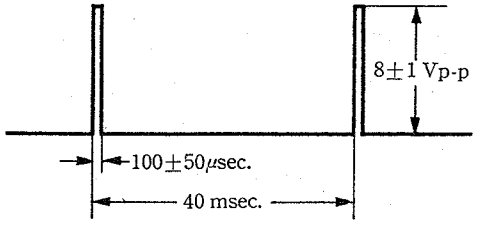


Fig. 14

12. Free-running Setting (Setting of DC Voltage)

* Check Point: TP205, 207

* Adjustment Point: R252

1. Connect a frequency counter to TP207.
2. Adjust R252 so that the indication of frequency counter becomes 2,460 Hz (Standard 2,460±30 Hz).
3. Connect an oscilloscope (at DC mode) to TP205.
4. Observe the saw-tooth waveform as shown in Fig. 15.

DC voltage of free-running $= \frac{Ⓐ - Ⓑ}{2} \times 1.3 + Ⓑ$

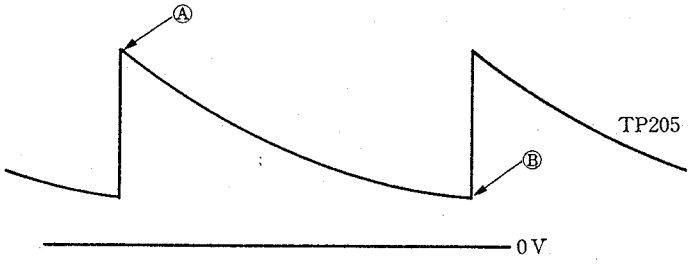


Fig. 15

13. Phase Control Circuit

* Check Point: TP204, 205, 206

* Adjustment Point: R245, 252

1. Place the unit in recording mode, and short-circuit CP201.
2. Connect a dual trace oscilloscope to TP204 and TP206 and set it to ADD mode.
3. Set R245 to center portion, and adjust R252 to equalize Ⓐ and Ⓑ shown in Fig. 16 with sync hronizing the waveform.
4. Adjust R245 for minimum pull-in rang and hunching.
5. Connect an oscilloscope to TP205, and adjust R252 so that the DC voltage of TP205 becomes as shown in item 12.

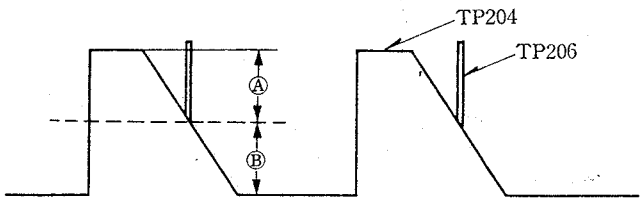


Fig. 16

14. Head Switching Position

* Check Point: TP201, 223

* Adjustment Point: R230

1. Place the unit in recording mode, and connect a dual trace oscilloscope to TP223 and set it to CHOP mode.
2. Adjust R230 so that the TP223 waveform is located 7±1 H before the front edge of vertical sync signal of composite video signal as shown in Fig. 17.

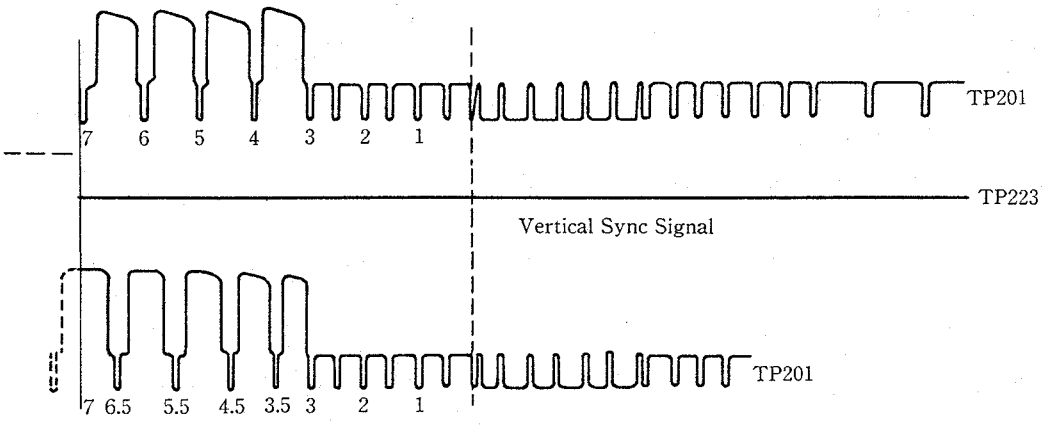


Fig. 17

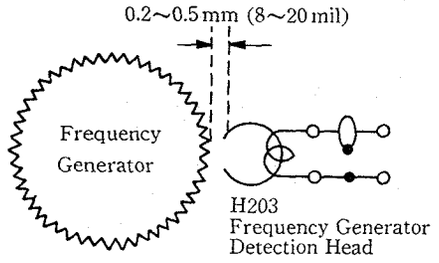
CAPSTAN CONTROL CIRCUIT

1. Spase Between the Frequency Generator & Detection Head

* Check Point: Detection Head (H203) Output Terminal

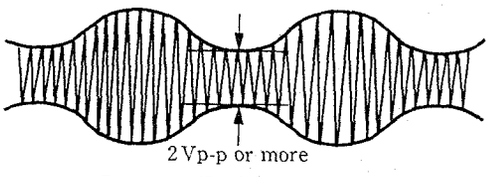
* Adjustment Point: Detection Head (H203)

1. Adjust the gap between the frequency generator and detection head for 8~20 mil (0.2~0.5 mm) (See Fig. 18).
2. Turn the power switch ON and rotate the motor.
3. Connect an oscilloscope to the detection head terminal.
4. Make sure that the waveform of detection head terminal becomes as shown in Fig. 19.



Frequency Generator Detection Head Gap

Fig. 18



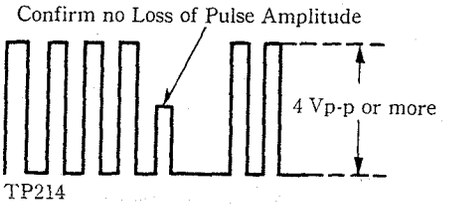
Detection Head H203 Output

Fig. 19

2. Speed Control Limiter

* Check Point: TP215

1. Connect an oscilloscope to TP215 and make sure that the complete waveform without any peak losses is fed out from the frequency generator.



Frequency Generator Output

Fig. 20

3. Speed Control Flip Flop

* Check Point: TP214

1. Connect an oscilloscope to TP214 and confirm the waveform as shown in Fig. 21.

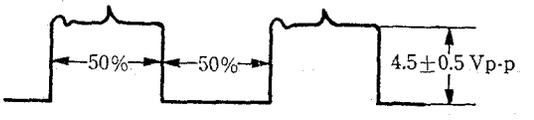


Fig. 21

4. Speed Control Monostable Multivibrator

* Check Point: TP215

* Adjustment Point: R291

1. Connect frequency counter to TP215.
2. Adjust R291 so that the frequency of TP215 becomes 2.5 kHz.

5. Speed Control Duty

* Check Point: TP216

1. Make sure that the waveform of TP216 becomes as shown in Fig. 22.

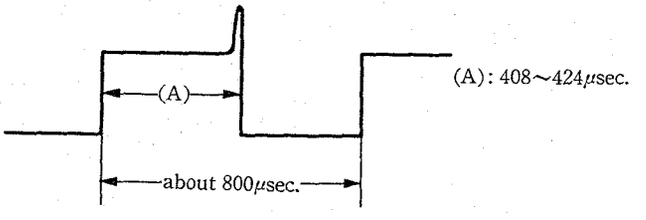


Fig. 22

6. Capstan Motor Current Waveform

* Check Point: TP217, Collector of Tr230

1. Cut between TP217 and collector of Tr230.
2. Insert 1Ω resistor, and connect an oscilloscope to both ends of 1Ω resistor.
3. Make sure that the waveform becomes as shown in Fig. 23.
4. Next insert an ammeter.
5. When the motor rotation is 1,500 rpm (2.5 kHz), the indication of ammeter becomes 300 mA or less (at Rec. Play mode).

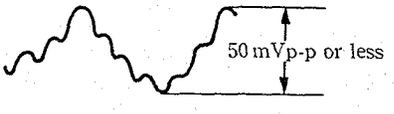


Fig. 23

7. Output of Capstan Detection Head

* Check Point: Detection Head (H204) Output Terminal
* Adjustment Point: Detection Head (H204)

1. Adjust the detection head position so that the waveform of output terminal become as shown in Fig. 24.

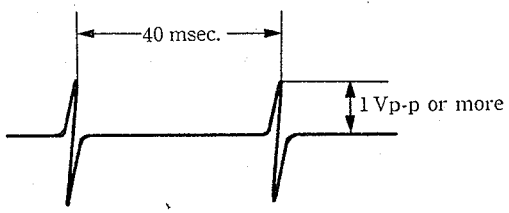


Fig. 24

8. Recording Current of Control Head

* Check Point: Control Head (H205)

1. Place the unit in recording mode.
2. Connect a 10Ω resistor to the ground side of control head (H205).
3. Connect an oscilloscope (DC mode) to both ends of 10Ω resistor.
4. Make sure that the waveform becomes as shown in Fig. 25.

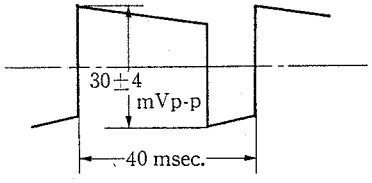


Fig. 25

9. Gate Wave

* Check Point: TP212

1. Connect an oscilloscope to TP212.
2. Make sure that the waveform of TP212 becomes as shown in Fig. 26.
3. Adjust R267 so that Ⓐ portion becomes 20±2 msec.

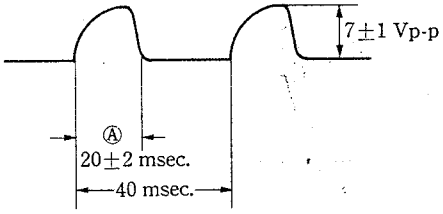


Fig. 26

10. Sampling Pulse

* Check Point: TP211

1. Connect an oscilloscope to TP211.
2. Make sure that the waveform of TP211 becomes as shown in Fig. 27.

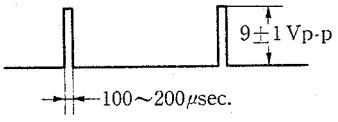


Fig. 27

11. Free-running Setting (Setting of DC Voltage)

* Check Point: TP213, 215
* Adjustment Point: R291

1. Connect a frequency counter to TP215.
2. Adjust R291 so that the indication of frequency countor 2,460 Hz (Standard: 2,460±30 Hz).
3. Connect an oscilloscope (at DC mode) to TP213.
4. Observe the saw-tooth waveform as shown in Fig. 28.

$$\text{DC voltage of free-running} = \frac{Ⓐ - Ⓑ}{2} + Ⓑ$$

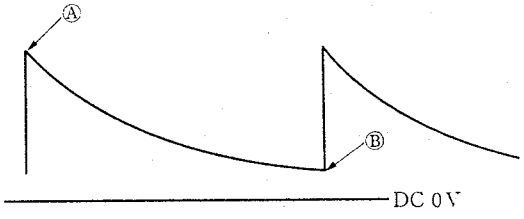


Fig. 28

12. Phase Control Circuit

* Check Point: TP211, 212, 213
* Adjustment Point: R290, 291

1. Place the unit in recording mode, and short-circuit CP202.
2. Connect a dual trace oscilloscope to TP211 and TP212 and set it to ADD mode.
3. Set R290 to center position, and adjust R291 to equalize Ⓐ and Ⓑ shown in Fig. 29 with synchronizing the waveform.
4. Adjust R290 for minimum pull-in range and hunching.
5. Connect an oscilloscope to TP213, and adjust R219 so that DC voltage of TP213 becomes as shown in item 11.

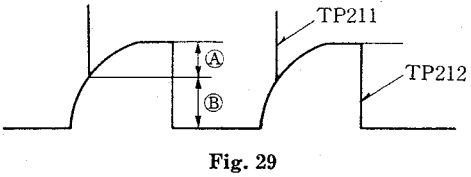


Fig. 29

13. Tracking Adjustment

* Check Point: TP202, 203, 223

* Adjustment Point: R202, 267

1. Place the unit in stop mode, and set the tracking control to FIX position.
2. Connect an oscilloscope to TP203, and adjust R202 so that the waveform of TP203 becomes as shown in Fig. 30.
3. Place the unit recording mode and connect a dual trace oscilloscope to TP202 and TP223 and set it to CHOP mode.
4. Observe TA waveform shown in Fig. 31.
5. Place the unit in stop mode, and connect a dual trace oscilloscope to TP203 and TP223 and set it to CHOP mode.
6. Observe TB of waveform shown in Fig. 32.
7. Adjust R267 to equalize TA and TB.

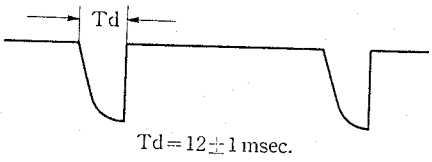


Fig. 30

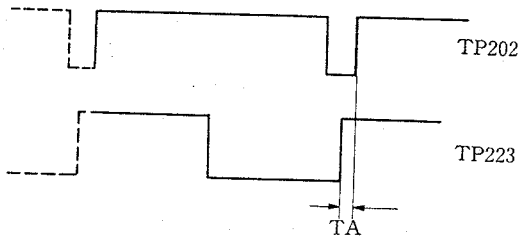


Fig. 31

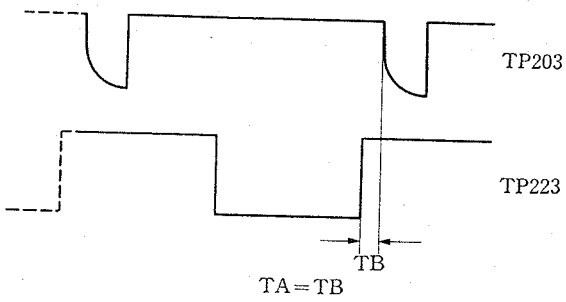


Fig. 32

14. Control Head Output Voltage

* Check Point: Control Head Output Terminal

1. Place the unit in playback mode by using the reference tape.
2. Make sure that the waveform becomes as shown in Fig. 33.

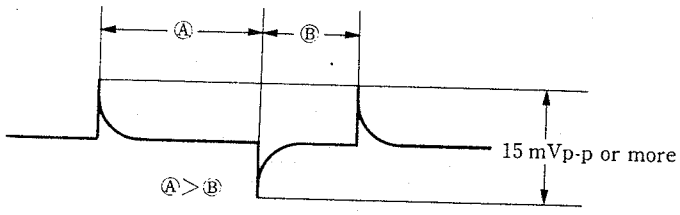


Fig. 33

15. Manual Tracking

* Check Point: TP203

* Adjustment Point: R201

1. Place the unit in stop mode, and connect an oscilloscope to TP203.
2. Adjust R201 and make sure that the waveform of TP203 becomes as shown in Fig. 34.

Ⓐ: min. of variable range; 6±2 msec.

Ⓑ: max. of variable range; 32±5 msec.

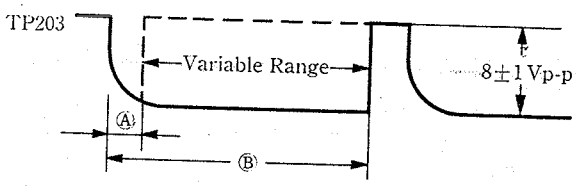


Fig. 34

SYNC CIRCUIT

Set the TV/CAMERA select switch to CAMERA position.

1. 15.625 kHz Oscillator Adjustment

* Check Point: TP218

* Adjustment Point: L205

1. Place the unit in recording mode, and connect a frequency counter to TP218.
2. Adjust L205 so that the indication of frequency counter becomes 15.625 kHz±4 Hz.

2. Horizontal Sync Buffer Oscillator Frequency Adjustment

* Check Point: TP221

* Adjustment Point: L206

1. Connect the collector of Tr233 to ground through electrolytic capacitor (16 V 47μF).
2. Place the unit in recording mode, and connect a frequency counter to TP221.
3. Adjust L206 so that the indication of frequency counter becomes 14.50±0.1 kHz.

3. Vertical Sync Signal Output

* Check Point: TP222

1. Place the unit in recording mode, and disconnect the camera.
2. Connect an oscilloscope to TP222, make sure that the waveform of TP222 becomes as shown in Fig. 35.

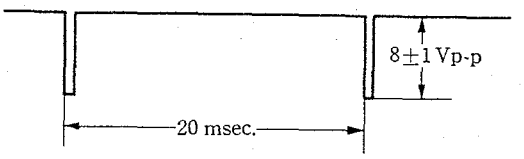


Fig. 35

4. Horizontal Sync Signal Output

* Check Point: TP221

1. Place the unit in recording mode, and disconnect the camera.
2. Connect an oscilloscope to TP221, and make sure that the waveform of TP221 becomes as shown in Fig. 36.

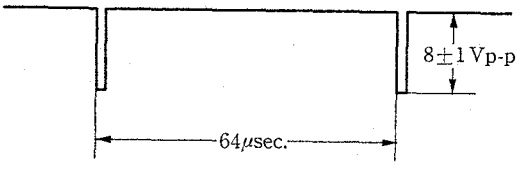


Fig. 36

5. Horizontal Sync Phase Adjustment

* Check Point: TP201, 221
* Adjustment Point: R2128

1. Place the unit in playback mode by using the monitor of camera.
2. Connect an oscilloscope to TP201 and TP221.
3. Adjust R2128 so that the waveform becomes as shown in Fig. 37.

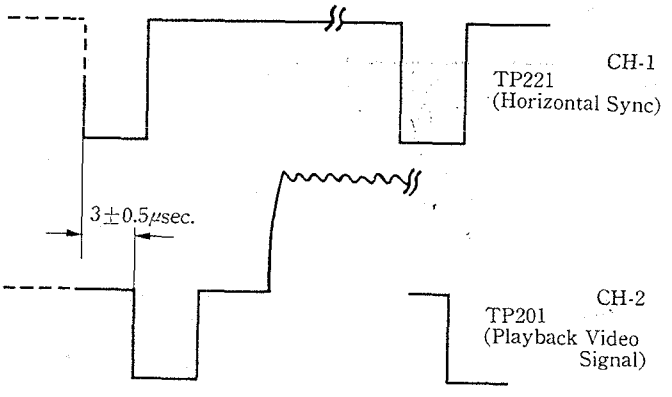


Fig. 37

6. Vertical Sync Phase Adjustment

* Check Point: TP201
* Adjustment Point: R2138

1. Connect a camera and place the unit in Rec. mode.
2. Connect an oscilloscope to TP201.
3. Adjust R2138, so that T becomes 56±8μsec. as shown in Fig. 38.

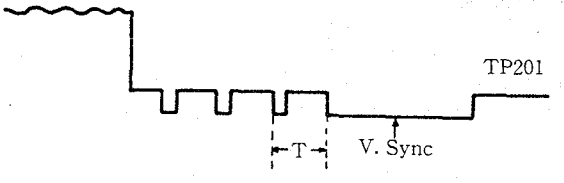


Fig. 38

PLUNGER DRIVE CIRCUIT

Plunger Voltage Adjustment

* Check Point: TP601, TP602
* Adjustment Point: R602

1. Set the external power supply to +11 V.
2. Set the TV/CAMERA select switch to TV, and place the unit in playback mode.
3. Connect a DC volt meter to TP601 (+) and TP602 (−).
4. Adjust R602 so that the indication of DC volt meter becomes 3.7 V.
5. Fix the heat sink completely by screw, and adjust above item within 8 to 12 sec. after depressing the play button.

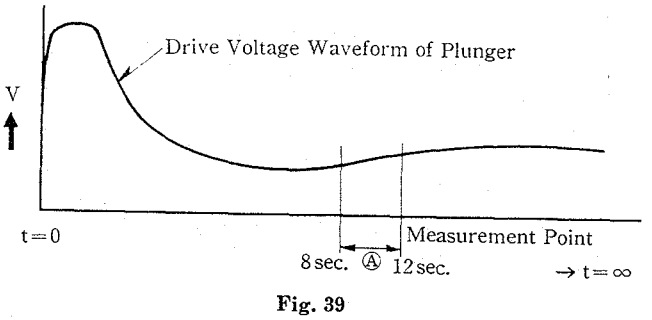


Fig. 39

Video Circuit

Playback Amplifier Balance

* Test Point: TP304

* Adjustment Point: R525, T501, 502, C510, 517, L510

1. Connect a signal generator (sweep generation) to TP502, and set its output level at TP502 to 110 mVp-p. Then change the range and reduce the output to 20 dB.
2. Connect an oscilloscope probe to TP304, turn on the power source without the tape threading and observe the waveform with the video head rotating.
3. While observing the output waveform at TP304, make the following adjustment.
   a) First, observe the output waveform and adjust sweep time of the oscilloscope so that the output waveform of channel-1 and channel-2 are superimposed.
   b) Adjust mixing level potentiometer R525 so that the output voltage of Ⓐ section gets balanced.
   c) Turn trimmer capacitors C510 and C517 (peaking adjustment) to center respectively.
   d) Adjust matching transformers T501 and T502 so that its peak frequency Ⓑ become approx. 5.1 MHz with the cores turning clockwise as much as possible. The reciprocal difference between both peak frequencies should be 0.2 MHz or less.
   e) Turning of the transformer may cause unbalance of Ⓐ section. When it causes, readjust balance of Ⓐ with R525.
   f) After adjusting section Ⓐ and Ⓑ, adjust C510 and C517 for balance of Q at around the peak.

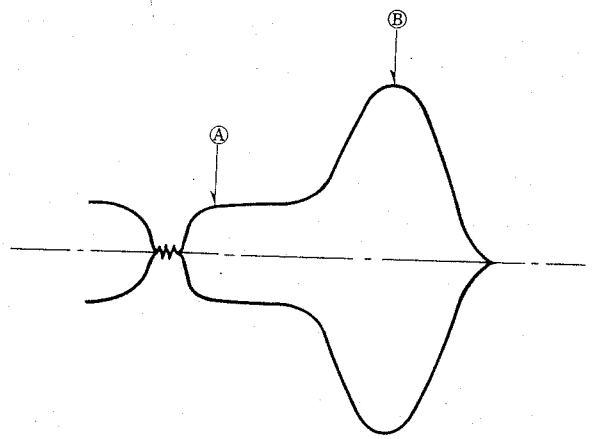


Fig. 40

   g) Finally adjust R525, T501, T502, C510 and C517 so that the best balance is obtained on both channels, and set them.
4. Connect a signal generator (sine-wave generator) in place of a sweep generator, set the output voltage to 1 Vp-p at the input side of 100 Ω, and output frequency to 70 kHz.
5. Adjust L510 so that the output waveform of 70 kHz at TP304 becomes minimum.

Playback Amplifier Response

* Check Point: TP304

1. Connect a signal generator to TP502 and supply 5.1 MHz, 1 mVp-p signal.
2. Remove C321 capacitor and ground the initial head amplifier collector of the opposite channel to be measured through 0.1 μF capacitor.
3. Connect a VTVM to TP304 and measure the output deviations by changing the frequency of signal generator (regarding the reading of 5.1 MHz as 0 dB).
4. Make the measurements on both channel respectively.

Frequency	Deviation	Frequency	Deviation
100 kHz	−20 dB or less	4 MHz	−1∼−4 dB
300 kHz	−10 dB or less	4.6 MHz	−0.3∼2 dB
500 kHz	−8.5∼−13.5 dB	5.1 MHz	0 dB
700 kHz	−7.5∼−12.5 dB	5.6 MHz	−0.3∼−2 dB
1 MHz	−7∼−12 dB	6 MHz	−1∼−4 dB
2 MHz	−5.5∼−10.5 dB	7 MHz	−4 dB or less
3 MHz	−3∼−8 dB	8 MHz	−8 dB or less

Demodulation Filter

* Check Point: TP306

1. Connect 75 Ω, 1 KΩ resistors and a signal generator as shown in Fig. 40.
2. Set output adjusting potentiometer R358 to center position.
3. Connect a VTVM to TP306 and supply 100 kHz, −20 dB signal to TP306 from the signal generator.
4. Change the frequency of signal generator and measure the output deviations.

Frequency	Deviation	Frequency	Deviation
100 kHz	0 dB	3.5 MHz	−2 dB or less
1 MHz	0±0.5 dB or less	4 MHz	−1∼−5 dB
1.5 MHz	0±0.5 dB or less	4.3 MHz	−6∼15 dB
2 MHz	0±0.5 dB or less	4.6 MHz	−15∼−30 dB
2.5 MHz	0±0.5 dB or less	5.0 MHz	−30 dB or less
3 MHz	−1 dB or less		

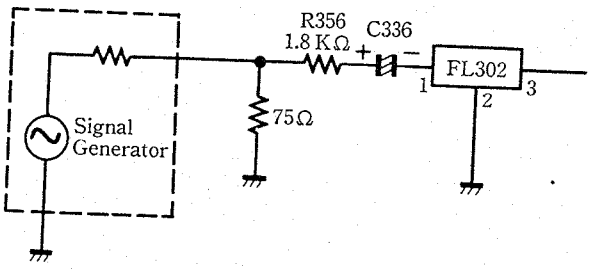


Fig. 41

Demodulator Balance

* Test Point: TP305

* Adjustment Point: R343, 351

1. Set R358 (output level adjuster) and R367 (cancel level adjuster) to nearly center respectively.
2. Connect a signal generator to TP502 and adjust its output frequency to 3.7 MHz. Set the output level so that approx. 1 mVp-p is obtained at TP501.
3. Connect an oscilloscope probe to TP305 and adjust limiter balancer R343 and demodulator balancer R351 so that the 3.7 MHz waveform becomes minimum.

Input Filter Response

* Check Point: R306

1. Connect a signal generator to TP301 and supply 100 kHz, 1 Vp-p signal.
2. Connect the VTVM to the input side of R306 and regard the reading of 100 kHz as 0 dB.
3. Change the frequency of signal generator and measure the deviations at each frequency in dB.

Frequency	Deviation	Frequency	Deviation
100 kHz	0 dB	3 MHz	−2 dB or less
1 MHz	±0.5 dB or less	3.5 MHz	−2 dB or less
1.5 MHz	±0.5 dB or less	4 MHz	−5 dB or less
2 MHz	−1 dB or less	4.5 MHz	−12 dB or more
2.5 MHz	−1.5 dB or less	5 MHz	−30 dB or more

AGC Function

* Check Point: Terminal ⑦ of IC301

1. Connect a signal generator to TP301 and feed 10 kHz, 1 Vp-p signal.
2. Connect a VTVM to the terminal ⑦ of IC301 and regard the reading at 10 kHz as 0 dB.
3. Measure the output level variations by changing the input level.

Note: Make the measurements a few minutes after varying the input level because of large time constant of CR.

Input Level	Output Level	Input Level	Output Level
+6 dB	+1 dB or less	−10 dB	−1 dB or less
0 dB	0 dB	−14 dB	−3.5 dB or less
−5 dB	−0.5 dB or less		

AGC Attack/Recover Response

* Check Point: Terminal ⑦ of IC301

1. Connect an oscilloscope probe to the terminal ⑦ of IC301 and set its sweep range to 1 sec./div. and its amplitude to 2 V/div.
2. Vary the input level instantly from −10 dB to 0 dB and measure the time when the output waveform starts varying until it gets stabilized.

AGC Attack Response: Less than 0.1 sec.

3. Vary the input level instantly from 0 dB to −10 dB and measure the time from when the output waveform starts varying until it gets stabilized.

AGC Recover Response Time: 4.5~10 sec.

Pre-emphasis Circuit

* Check Point: TP302

1. Connect Tr304 collector to Tr305 collector through 0.01 μF capacitor.
2. Turn the white clip potentiometer R315 fully counterclockwise.
3. Cut the foil between R312 and C310.
4. Connect a signal generator to the C310 minus (−) side and set the input voltage to 50 mVp-p.
5. Connect a VTVM to TP302 and measure the response by varying the frequency with regarding the reading of 100 kHz as 0 dB.
6. After adjustment reconnect the cut foil.

Frequency	Deviation	Frequency	Deviation
10 kHz	0 dB	1.5 MHz	8.9~10.4 dB
100 kHz	0~0.1 dB	2 MHz	9.4~10.9 dB
300 kHz	2.4~3.9 dB	3 MHz	9.8~11.3 dB
500 kHz	4.7~6.2 dB	4 MHz	9.9~11.4 dB
700 kHz	6.3~7.8 dB	5 MHz	10.0~11.5 dB
1 MHz	7.7~9.2 dB		

Oscillation Frequency

* Test Point: TP303
* Adjustment Point: R317

1. Connect a frequency counter to TP303.
2. Place the unit in E-E mode and set the TV/CAMERA selector switch to TV.
3. Adjust R317 so that the oscillation frequency becomes 3.7 MHz.

E-E Mode Balance

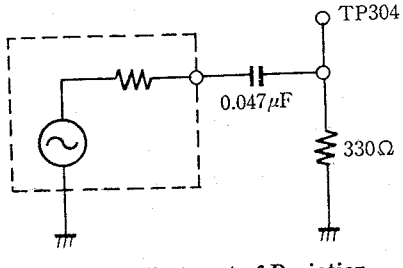
* Test Point: TP305
* Adjustment Point: R330, C318

1. In the same connection as above, connect an oscilloscope probe to TP305 and adjust R330 so that the 3.7 MHz waveform becomes minimum.
2. When the adjustment is not satisfied with R330 singly, some what deviate C318 and then readjust balance with R330.
3. Because the oscillation frequency of the modulator varies when C318 is moved, it is necessory to readjust the frequency.

Deviation

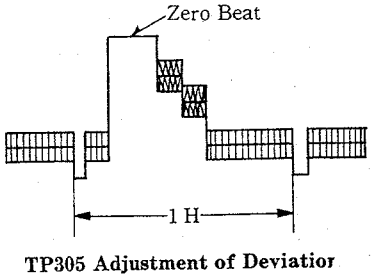
* Test Point: TP305
* Adjustment Point: R312

1. Supply stair-case signal of signal generator to TP301.
2. Place the unit in E-E mode, and set the TV/CAMERA selector switch to TV.
3. Connect the signal generator to TP304 through 0.047 μF, and set the output frequency to 5.1 MHz and its level at −40~−45 dB.
4. Connect an oscilloscope probe to TP305 and while observing the waveform, turn R312 clockwise gradually.
5. Adjust it so that the white portion becomes zero beat.



TP304 Adjustment of Deviation

Fig. 42



TP305 Adjustment of Deviation

Fig. 43

Video Output Voltage

* Test Point: TP305
* Adjustment Point: R358

1. Supply stair-case signal of signal generator to the video input terminal.
2. Place the unit in E-E mode, and set the TV/CAMERA selector switch to TV.
3. Connect an oscilloscope probe to TP305 and turn output level potentiometer R358 gradually.
4. Set R358 so that the output level at TP305 becomes 1 Vp-p.

White Clip

* Test Point: TP302
* Adjustment Point: R315

1. Supply stair-case signal of the signal generator to TP301.
2. Connect an oscilloscope probe to TP302.
3. In the state of standard modulation, gradually turn R315 clockwise and set it just before the waveform tip is cliped as shown in Fig. 44 (2) and (3).

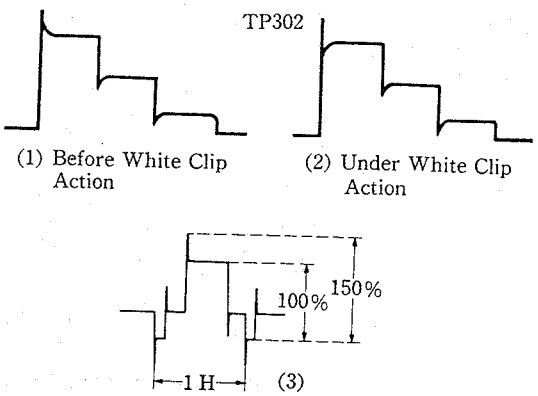


Fig. 44

Luminance Signal Recording Current

* Test Point: TP501
* Adjustment Point: R502

1. Connect an oscilloscope probe to TP501.
2. Set the TV/CAMERA selector switch to TV.
3. Place the unit in recording mode at no signal.
4. Adjust R502 so that the waveform becomes 450 mVp-p.
5. After adjustment, short-circuit TP501 to ground.

Noise Canceller Adjustment

* Check Point: TP305
* Adjustment Point: R367

1. Connect a signal generator (4.5 MHz, 100 mV) to TP502.
2. Connect an oscilloscope to TP305.
3. Adjust R367 so that 4.5 MHz component becomes minimum.

Audio Circuit

MEASUREMENT OF AUDIO CIRCUIT BOARD ASSEMBLY (NOT ASSEMBLED IN VTR)

Following measurements are to check that audio circuit board assembly singulary as an audio amplifier. Test equipment to be used should be improved ones (0 dB = 1 V rms).

Record Amplifier Power Consumption

1. Make connections shown in Fig. 45.
2. Make sure that the supply current of each section is in the range specified below.
   Ia...20 mA ±15% (Va = +12 V)
   Ib...140 mA ±15% (Vb = +9 V)

Note: The record/playback switch should be placed on record side without fail. Input signal should be zero (no-signal).

P.C.B. Assembly, Audio Circuit

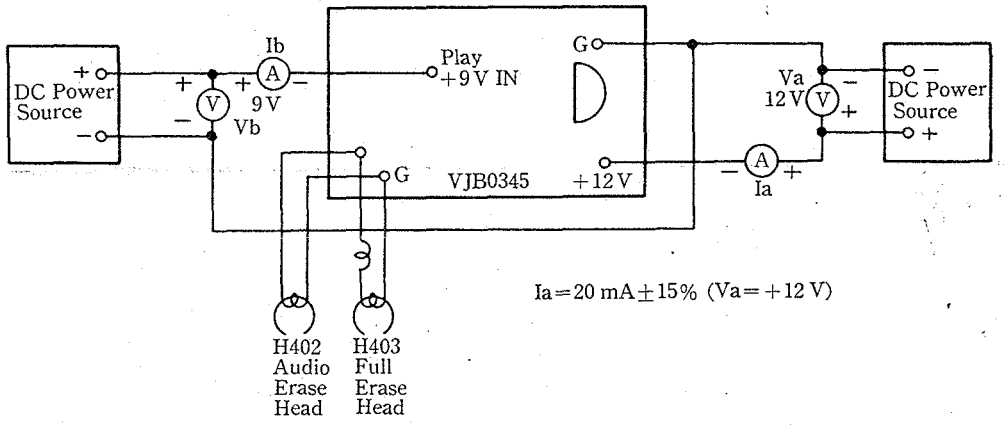


Fig. 45

Playback Amplifier Power Consumption

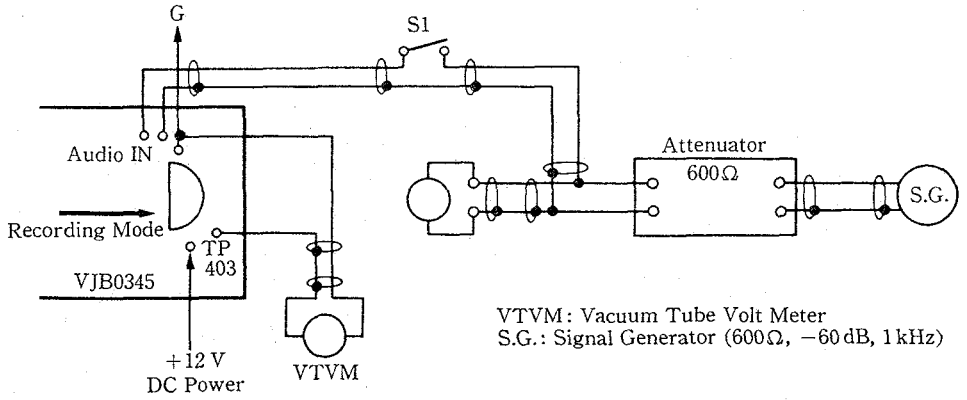
1. Make connections as shown in Fig. 45.
2. After confirming the record amplifier current consumption, turn off the +9 V power source and set the record/playback switch to playback side.
3. Make sure that the supply current is in the following range on playback mode.
   Ia...20 mA ±15% (Va = +12 V)

Record Amplifier Sensitivity

* Check Point: TP403

1. Make connections shown in Fig. 46, and set the record/playback selector switch to record side.
2. Supply DC 12 V from the DC power source.
3. Supply 600 Ω, −60 dB, 1 kHz signal to the audio in terminal from the signal generator and connect a VTVM to TP403.
4. Make sure that the indicated value is in the following range.
   1 V rms $^{+0.3\text{ V rms } (+2.3\text{ dB})}_{-0.37\text{ V rms } (-4\text{ dB})}$ (0 dB = 1 V rms)

Note: Measure 600 Ω, −60 dB, 1 kHz signal with S1 switch opened.



VTVM: Vacuum Tube Volt Meter
S.G.: Signal Generator (600 Ω, −60 dB, 1 kHz)

Fig. 46

Record Amplifier Frequency Response

* Check Point: TP403 (audio output)

1. Make connections shown in Fig. 46.
2. With S1 open, make the attenuator output (1 kHz) constant at −70 dB (Check every frequency for measurement with S1 open to keep attenuator output at −70 dB).
3. Vary frequency of the signal generator as the followings, and measure the audio output (TP403) with a VTVM.
   Frequency: 100 Hz, 400 Hz, 4 kHz, 8 kHz, 10 kHz
4. Counting the indication of VTVM at 1 kHz frequency as 0 dB, measure the output at each frequency in 0 dB.
5. Make sure that the output decibel difference against 1 kHz is within the deviation specified below.

Frequency	TP403 Output	Frequency	TP403 Output
100 Hz	+2～−4 dB	8 kHz	0～−4 dB
400 Hz	+2～−2 dB	10 kHz	0～−6 dB
4 kHz	+2～−2 dB		

Playback Amplifier Impedance

1. Connect a 10 KΩ resistor in series with H2 as shown in Fig. 47, and measure the signal voltage V1 and V2 (Input signal voltage: 1 kHz).
2. Make sure that the voltage at V2 is 0.47 mV or higher when input signal voltage of V1 is 1 mV.

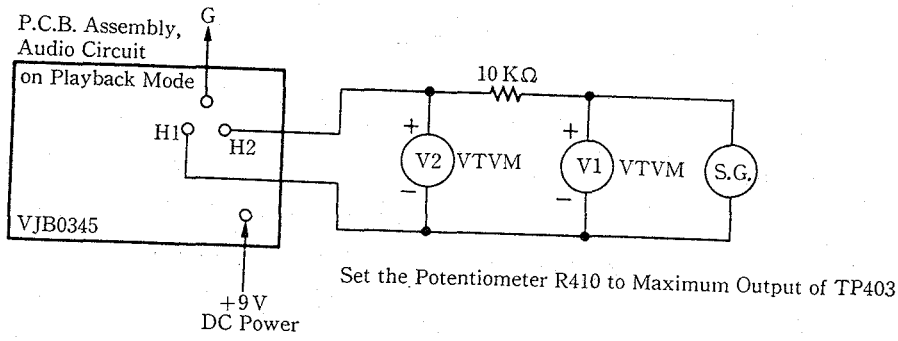


Fig. 47

Playback Amplifier Gain

* Check Point: Audio Head Terminal
* Adjustment Point: R410

1. Make connections shown in Fig. 48.
2. Supply 1 kHz, −60 dB (1 mV) signal to both ends of 10Ω resistor from signal generator through the attenuator.
3. Adjust R410 (20 KΩ) so that the maximum output is obtained at TP403.
4. Vary the attenuator so that the VTVM connected with TP403 indicates 0 dB, and measure the level at both ends of 10Ω resistor when the output at TP401 is 0 dB by the VTVM.
5. Make sure that the voltage of both ends of 10Ω resistor measured in item 4 is in the range specified below.
   Range: −63～−75 dB

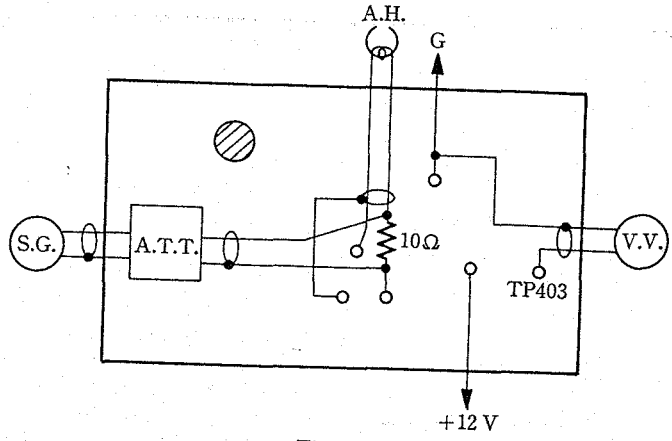


Fig. 48

Head Current

* Test Point: Audio Head, Audio Erase Head, Full Erase Head, TP403
* Adjustment Point: C431

1. Make connections as shown in Fig. 49, and supply DC 9 V with the circuit from DC power source.
2. Set the record/playback selector switch to record side and adjust C431 so that the voltage of both ends of 10Ω resistor connected to the ground side of the audio head becomes 6.5±0.5 mV with use of VTVM.

$$\text{Audio bias current} = \frac{6.5 \times 10^{-3}}{10\Omega} = 650\mu A$$

3. Connect an oscilloscope probe to TP405 and make sure of the following.
   a. Period..... 16.7~12.5μsec.
   b. Voltage ..... 44 Vp-p or higher
   c. Waveform Distortion ... Waveform visually inspected shall be satisfactory
4. Measure the voltages of both ends of 1Ω resistor connected to the ground side of the audio erase head and the full erase head with a VTVM, and make sure of the following values.
   a. Full Erase Head Current ..... 160 mA or higher
   b. Audio Erase Head Current ... 160 mA or higher
5. Make sure that the amperage at DC ammeter is the value shown in below.
   Audio Erase Circuit Current ... 140 mA±15%

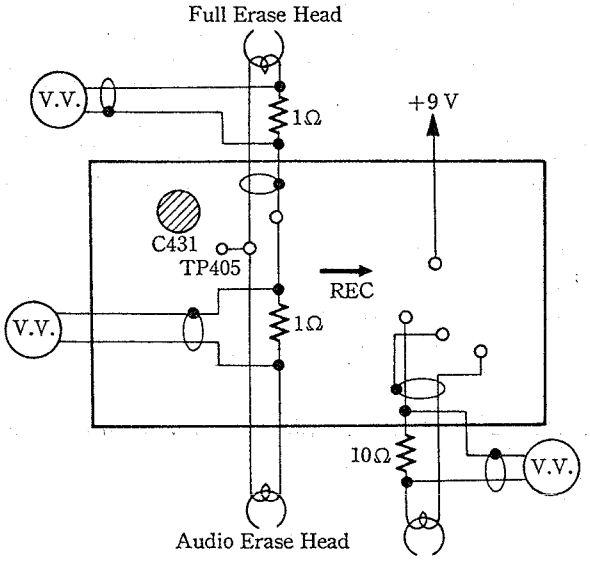


Fig. 49

ADJUSTMENT WITH AUDIO CIRCUIT BOARD ASSEMBLY (ASSEMBLED WITH VTR UNIT)

Supply DC +12 V power to the VTR from DC IN receptacle by AC adaptor and set the TV/CAMERA selector switch to TV.

Supply Voltage

* Check Point: +12 V Power In Terminal

1. Place the VTR in stop mode.
2. Connect a VTVM (DC) to the +12 V terminal and make sure that the supply voltage is 12±0.5 V.
3. Place the unit in recording mode and make sure that the voltage supplied to the erase oscillator is 9±0.2 V.

Erase Oscillator

* Test Point: TP403, 405
* Adjustment Point: C431, L401

1. Disconnect the wire connected to H1 of the circuit board and connect a 10Ω resistor between the disconnected wire and H1.
2. Connect the 1Ω resistor between the ground side of the audio erase head and the ground side of the full erase head, and the ground side of the shield wire respectively.
3. Place the unit in recording mode and connect an oscilloscope probe to TP403.
   Note: Confirm +12 V power of the erase oscillator.
4. Adjust C431 so that the voltage of both ends of 10Ω resistor becomes 6.5±0.5 mV (audio bias current).
5. Adjust L401 so that the erase oscillation element at TP403 becomes minimum by the oscilloscope.
6. Confirm the voltage at both ends of a 10Ω resistor again.
7. Connect the oscilloscope probe to TP405 and make sure the following.
   a. Period ... 16.7~12.5μsec.
   b. Voltage... 44 Vp-p or more
8. Next, place the unit in audio dubbing mode.
9. Make sure that the audio bias current is within 550~750μA.
10. Make sure the following at TP405.
    a. Period ... 16.7~12.5μsec.
    b. Voltage... 44 Vp-p or more
11. Place the unit in recording mode.
12. Connect a VTVM (DC) to both ends of 1Ω resistor and make sure that the indicated value is in the range specified below.
    a. Audio Head Side ..... 160 mV or more
    b. Full Erase Head Side... 160 mV or more
13. Remove the connected resistors and return the unit into the original state.

Playback Gain

* Test Point: TP403
* Adjustment Point: R410

1. Turn the potentiometer R410 to center.
2. Thread the tape and place the unit in playback mode.
3. Make sure that the audio head is mounted vertical to the tape run direction.
4. Place the unit in REC mode and connect a VTVM to TP403.
5. Supply 1 kHz signal to the audio in terminal (⑦ and ⑧ of 10P connector) and adjust the input signal level so that the VTVM at TP403 becomes 0 dB (1 V rms).
6. Record the signal above.
7. Playback the recorded signal and adjust R410 so that the VTVM at TP403 becomes 0 dB (1 V rms). The level fluctuation at TP403 should be 5 dB or less (measuring for 60 seconds or more).

Overall S/N Ratio

* Check Point: TP403

1. Place the unit in recording mode and supply non-signal.
2. Measure the noise level at TP403 with a VTVM and make sure that the noise level is −40 dB or less.
3. Make recording on the above condition.
4. Playback the portion recorded above and measure the non-signal playback output level with the VTVM.
5. Make sure that the measured value is −40 dB or less (overall noise).

Overall Frequency Response

* Check Point: TP403

1. Supply the input signal which level is −70 dB constant through the attenuator from the signal generator to the MIC input jack.
2. Vary the frequency of the signal generator and record these signals of 100 Hz, 400 Hz, 4 kHz, 8 kHz, 10 kHz.
3. Connect a VTVM to TP403, place the unit in playback mode, and measure the playback outputs corresponding to these frequencies (read the value in dB).
4. The playback output voltage measured in item 3 shall be as follows (1 kHz playback output 0 dB).

Frequency	Deviation	Frequency	Deviation
100 Hz	+3～−3 dB	8 kHz	+3～−3 dB
400 Hz	+2～−2 dB	10 kHz	+1～−7 dB
4 kHz	+3～−2 dB		

MECHANISM DISASSEMBLY METHOD

HOW TO REMOVE PANEL

1. Remove the case cover.
2. Loosen 6 screws (A) and remove them.
3. Then pull over the panel and remove it.

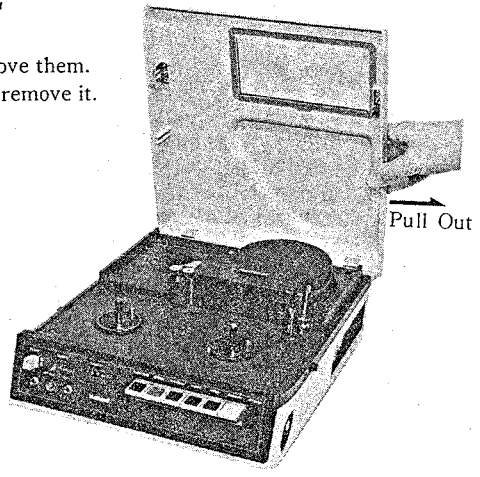


Fig. 1

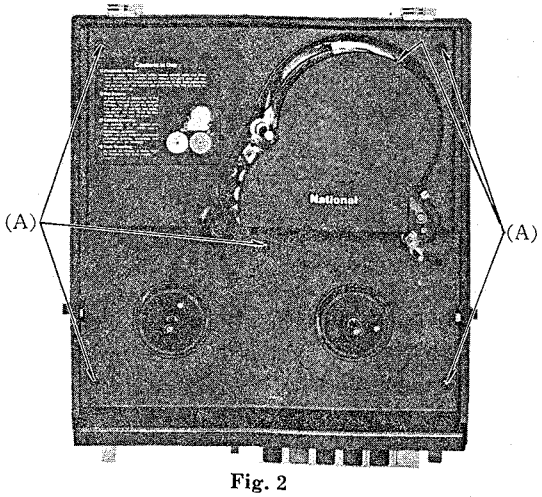


Fig. 2

HOW TO REMOVE CASE

1. Loosen 4 screws (B) and remove them.
2. Then pull over the case.

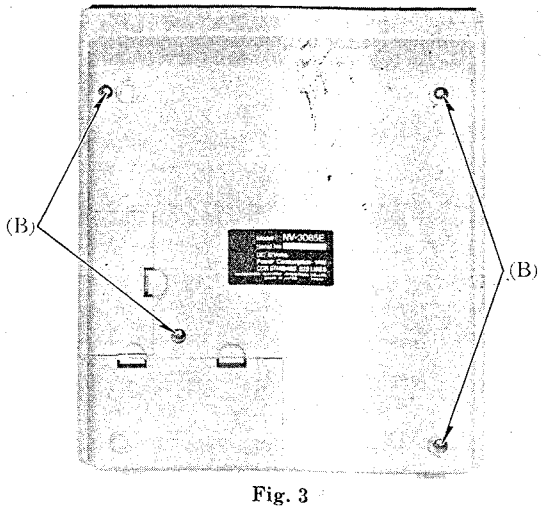


Fig. 3

HOW TO REMOVE FRONT PANEL

1. Loosen 6 screws (C) and remove them.
2. Then pull over the front panel.

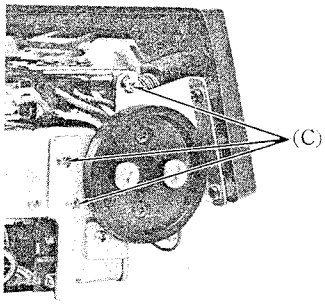


Fig. 4

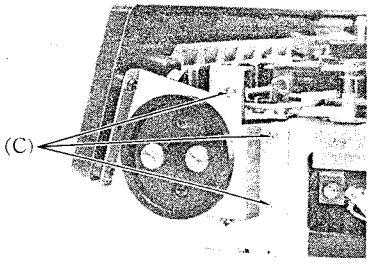


Fig. 5

HOW TO REMOVE SHOULDER BAND

1. Hold the shoulder band connector (D), and turn to the counter-clockwise completely.
2. Then pull over them.

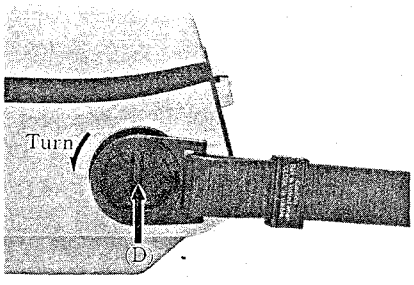


Fig. 6

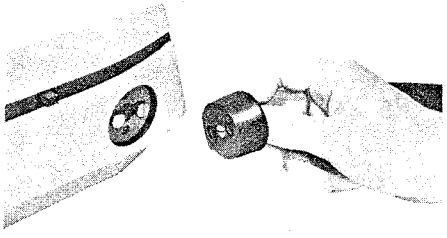


Fig. 7

MECHANICAL SECTION ADJUSTMENTS

BRAKE FORCE ADJUSTMENT (in stop mode)

* Adjustment Point: Brake Roller (supply reel, takeup reel)

Measurement

1. Place the unit in stop mode.
2. Put the 5″ full wound tape reel on the takeup reel table and supply reel table respectively and attach the tension gauge (VFK0100/300 gr. max. or VFK39/150 gr. max.) to the end of tape as shown in Fig. 8.
3. Pull the gauge slowly at a constant speed to the tangent direction of reel.
4. Read the value when the tension gauge needle settles. Brake force of (A) direction should be 35 gr. or less (200 gr-cm or less) and (B) direction should be 130~200 gr. (800~1200 gr-cm).

Adjustment

Tighten or loosen the nut of the brake roller.
Change the hooking position of Brake spring.
After adjustment, make sure that the tape is not loose when placing the unit in stop mode from other modes.

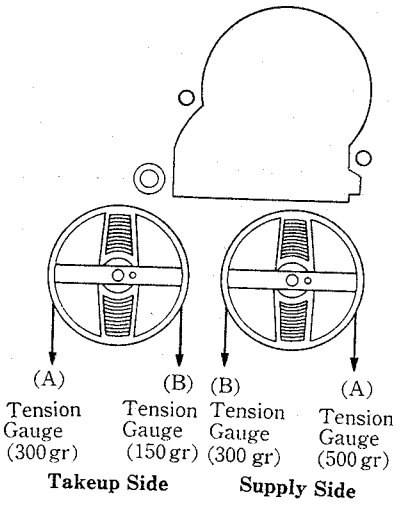


Fig. 8

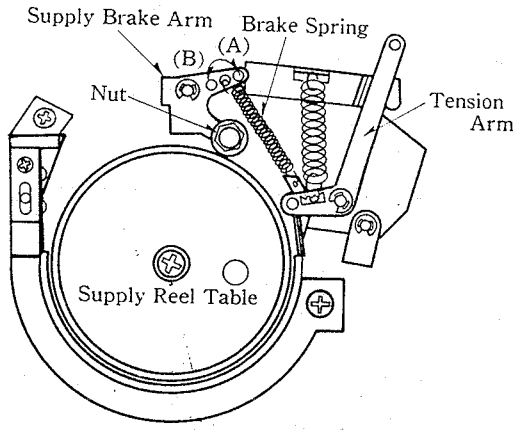


Fig. 9

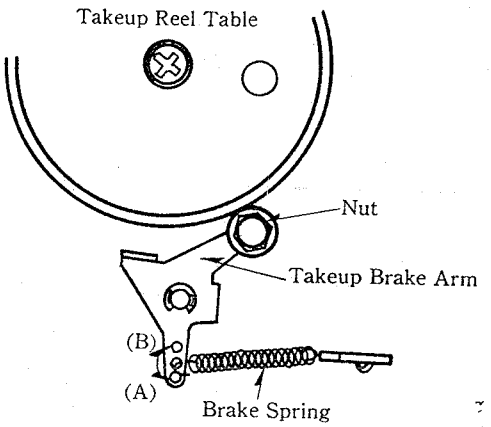


Fig. 10

PRESSURE FORCE OF PRESSURE ROLLER

* Adjustment Point: Solenoid
Pressure Roller Control Angle Unit (A)

Measurement

1. Hang a loop of string on the pressure roller shaft and attach the tension gauge (VFK66, 2 kg max.) to the string as shown in Fig. 11.
2. Turn the power on and place the unit in playback mode.
3. Pull the gauge in arrow direction (a straight line between the centers of the capstan and the pressure roller) gradually.
4. Measure the pressure force at the time that the tape stops running.
   Pressure force: 1.3~1.5 kg

Adjustment

1. Adjust the position of the solenoid so that the tolerance (A) is 0.8~1.2 mm at the time that the solenoid is worked.
2. After adjusting the position, adjust the position of pressure roller control angle unit (A) by using screw (A) so that the tolerance (B) is 0.3~0.5 mm.
3. After adjustment, measure the pressure force again. If it is no good, adjust the pressure force by bending the position (C).

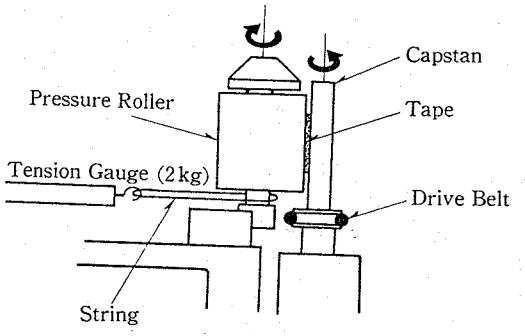


Fig. 11

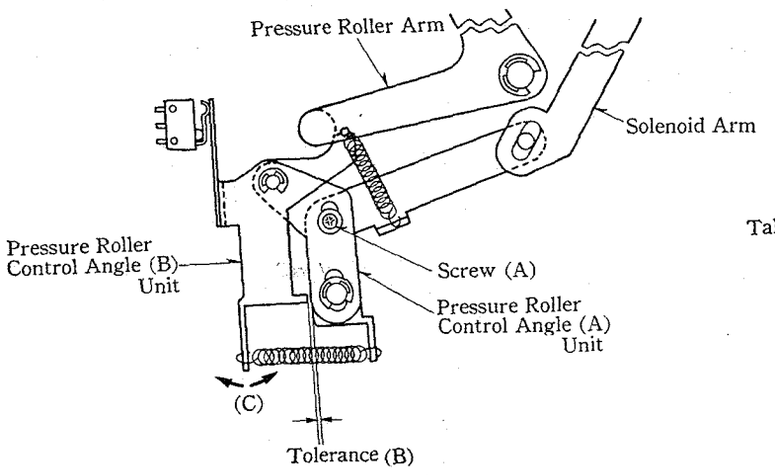


Fig. 12

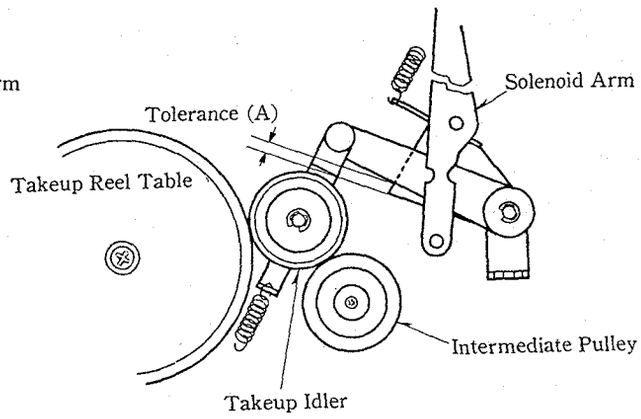


Fig. 13

BACK TENSION IN PLAYBACK MODE

* Adjustment Point: Tension Arm Spring
  Tension Band Angle

Measurement

1. Put the full wound tape reel on the supply reel table and thread the tape as shown in Fig. 14.
2. Set the tension gauge (VFK62, 100 gr max.) to the end of tape.
3. Pull out the gauge in arrow direction at a constant speed (the same speed as the tape running on playback mode).
4. Measure the tension while pulling out the gauge.
   Back Tension: 45~60 gr

Adjustment

1. Change the position of the spring hooks on the tension arm either to right or left.
   To Right, Back Tension Decreases
   To Left, Back Tension Increases
2. If it cannot be adjusted in item 1, change the position of tension band angle.

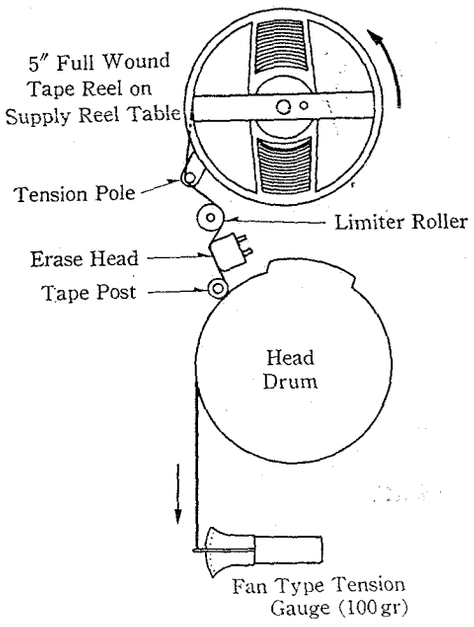


Fig. 14

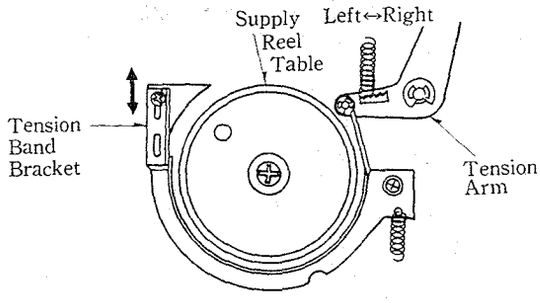


Fig. 15

TAKEUP TENSION OF TAKEUP REEL TABLE IN PLAYBACK MODE

* Adjustment Point: Flat Spring of Takeup Reel Table

Measurement

1 Put the 5″ half wound tape reel on the takeup reel table and set the tension gauge (VFK62, 100 gr max.) as shown in Fig. 16.
2. Place the unit in playback mode.
3. With keeping the spring gauge stationary, measure the tension.
   Takeup Tension: 44~57 gr

Adjustment

1. Change the position of flat.spring (mounted takeup reel table).
2. Increase the torque by putting polyslider washer (VMX0036) in the (A) position.

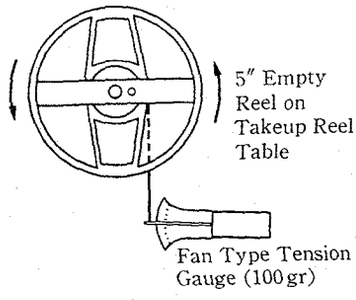


Fig. 16

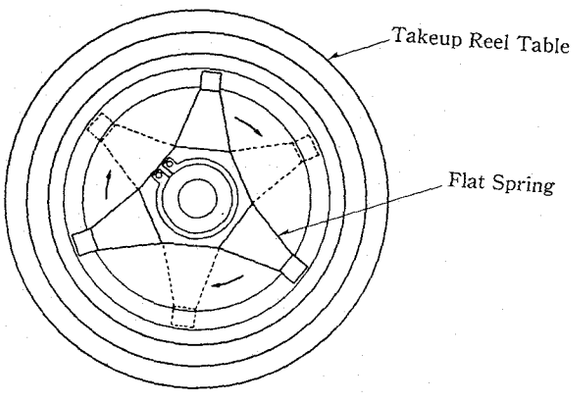


Fig. 17

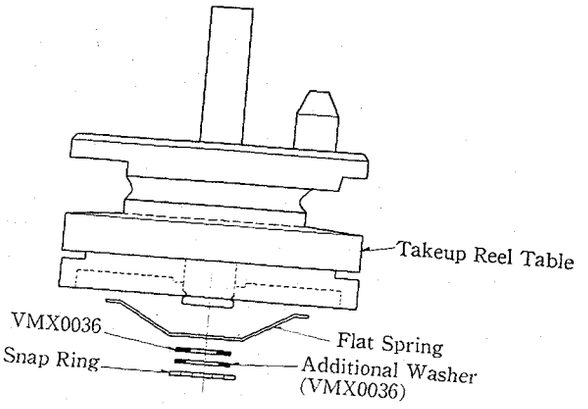


Fig. 18

TAKEUP TENSION OF TAKEUP REEL TABLE IN FAST FORWARD MODE

1. Put the full wound tape reel on the takeup reel table and set the tension gauge (VFK39, 150 gr max.) to the end of tape.
2. Place the unit in fast forward mode.
3. Pull the gauge until the takeup reel stops rotating, and then gradually return the gauge until the takeup reel table starts rotating.
4. Measure the tension at the time.
   Takeup Tension: More than 100 gr
5. For adjustment, replace the drive Belts, Reel Table, Intermediate Pulley, Takeup Idler.
   Note: Before adjustment, wipe away oil or grease if adhering to the reel table, idler, pulley by using freon liquid.

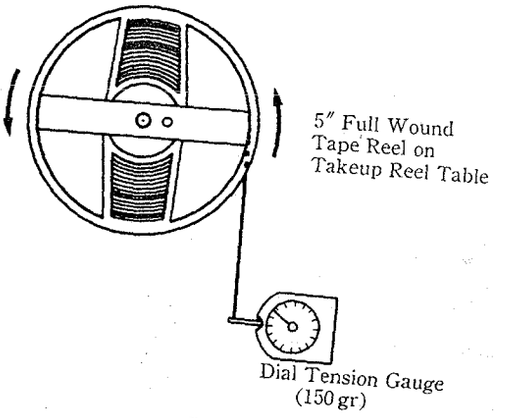


Fig. 19

TAKEUP TENSION OF SUPPLY REEL TABLE IN REWIND MODE

1. Put the full wound tape reel on the supply reel table and set the tension gauge (VFK39, 150 gr max.) to the end of tape.
2. Place the unit in rewind mode.
3. Pull the gauge until the supply reel table stops rotating.
4. Return the gauge gradually and read the tension when the supply reel table starts rotating.
   Takeup Tension: More than 100 gr
5. For adjustment, replace the Belt, Rewind Pulley, Reel Table.
   Note: Before adjustment, wipe away oil or grease if adhering to the reel table, idler, pulley by using freon liquid.

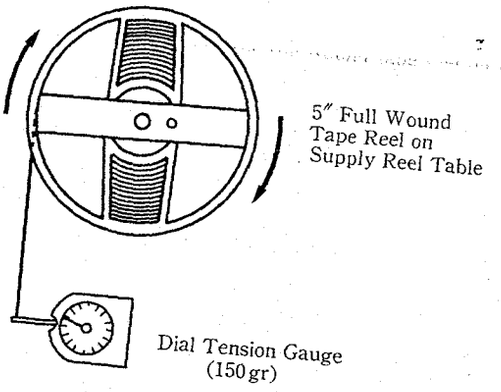


Fig. 20

WOW & FLUTTER

1. Connect the wow meter to the audio output terminal and playback the recorded reference tape.
2. Measure the frequency variation (wow & flutter) at the beginning portion of the tape, middle and end for approx. 1 minute at least 2 times.
3. Calculate each average of value measured at three different portion and take the maximum value of the averages for wow & flutter.
4. For adjustment, replace the parts, Supply Reel Table, Capstan Unit, Capstan Motor Pulley, Pressure Roller.
   Wow & Flutter: 0.3 rms or less
   (maintain power voltage of 12 V±5%)
5. Make sure that the brake shoe or rewind pulley is off from the supply reel table.

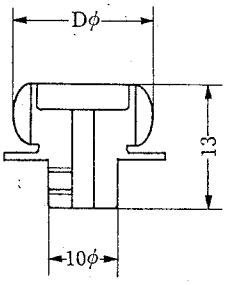
TAPE SPEED ADJUSTMENT

* Check Point: TP215
* Adjustment Point: Capstan Motor Pulley
* Specifications: Tape Speed; 16.322 cm/sec.
  Speed Deviation; ±0.25% or less (2,500±6.5 Hz)
  Speed Variation Range; 0.3% (7.5 Hz) or less

Measurement & Adjustment

1. Connect the frequency counter to TP215 and make sure of 2,500 Hz frequency.
2. Playback the recorded reference tape for speed adjustment (2.5 kHz signal) and measure the 2.5 kHz signal for 10 sec. with the frequency counter at the beginning portion of the tape, middle and end at least 2 times.
3. Calculate each average of the values measured at three different portions and the maximum value is to be the tape speed deviation.
4. And then calculate each balance of the measured values at three different portions and the maximum value is to be the tape variation range.
5. Replace capstan motor pulley so that the frequency counter indication becomes 2,500 Hz in playback mode.

Mark	Part No.	Diameter (Dϕ)	Remarks
2	VDP218	17.25±0.010 mm	faster ↑
1	VDP217	17.20±0.010 mm	
0	VDP299	17.15±0.010 mm	Standard
6	VDP0341	17.10±0.010 mm	
7	VDP0344	17.05±0.010 mm	↓ slower
8	VDP0345	17.00±0.010 mm	



Capstan Motor Pulley

Fig. 21

TAPE TRANSPORT ADJUSTMENT

Tape and Reel Table

Tape must not contact with the reel flange. For adjusting, put poly-slider washer into the upper side of reel when the tape contacts with lower side of reel flange, or put it into the down side of reel when the tape contacts with upper side of reel flange.

Tape and Tape Guide Post

Adjust the height of the tape guide post so that the tape runs surely along the tape guide lead.

Pressure Roller and Tape

Make sure that no clearance are find between the capstan shaft and pressure roller. Make sure that the tape does not move up and down between capstan shaft and pressure roller. For adjusting, replace the pressure roller or bend the pressure roller arm.

Tape and Tape Guide

Make sure that the tape does not protrude from the groove of tape guide. Adjust the height of the tape guide post so that the tape runs surely along the tape guide lead.

Tape and Heads

Adjust the heads position with the screws (F) so that the each head (Erase Head, Audio/Control Head) contacts with the tape firmly and correctly.

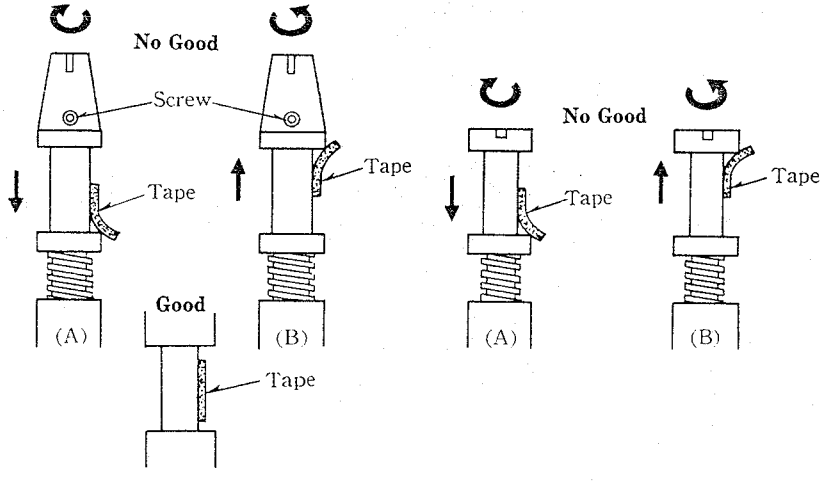


Fig. 22

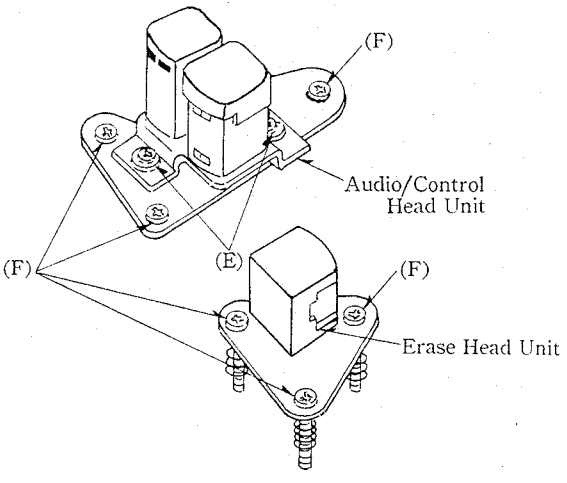


Fig. 23

HORIZONTAL SWAY OF PICTURE

1. Connect the monitor TV (9″) to VTR, and playback the pattern signal.
2. Measure the value of horizontal sway on the picture. The sway should be 1.5 mm or less.
3. For adjustment, replace the parts, Supply Reel Table, Pressure Roller, Capstan, Capstan Belt, Motor Pulley, etc.

INTERCHANGEABILITY ADJUSTMENT

* Adjustment Point: Tape Guide Post, Audio/Control Head, Detection Head, Video Head

Playback Shifter Variation Range

1. Connect an oscilloscope to TP203 and ground.
2. Connect a TV monitor to the unit by VTR-TV connection cable and playback the recorded reference tape.
3. Turn the tracking control, and read the playback shifter variation range when the beat for tracking error does not appear on the picture.
   Variation Range: 8 msec. or more
4. For adjustment, refer TAPE TRANSPORT ADJUSTMENT.

Control Head Position

1. Use the same measurement procedures as above.
2. As against the fix position of playback shifter, the tape interchangeability margins to forward and backward should be 3 msec. or more and difference of their margins should be 1 msec. within.
3. Loosen the adjusting screws (E) and move the audio/control head right or left to satisfy the above value. (See Fig. 23.)

Video Output Stability

* Envelope Output Variation

1. Connect an oscilloscope probe to TP308 and ground.
2. Connect the monitor TV to the unit and playback the reference tape, and measure the video output envelope.
3. Measure the maximum output (V), output at the upper portion of video track (V_1), at the middle portion (V_2) and at the lower portion (V_3).
   $V_1/V>70\%$, $V_2/V>80\%$, $V_3/V>70\%$
4. Adjust posts; audio/control head and erase head height or inclination to satisfy the above values.

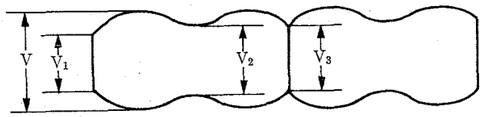


Fig. 24

HEAD SWITCHING TIME

1. Connect an oscilloscope probe to TP308 and place the tracking adjuster in fix position.
2. Playback the recorded reference tape.
3. Adjust the drum detection heads positions to get no gap of envelope which is balanced as shown in Fig. 24, and make sure of no head switching gap at any position of playback shifter.
   Head Switching Time: 125~300μsec. (approx. 2~5 H)

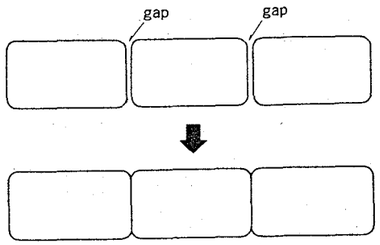


Fig. 25

Video Head Replacement

1. Unscrew 3 screws (A) and remove brush base plate assembly (B).
2. Unsolder four lead wires (C) connected to video head and disconnect the wires.
3. Unscrew 2 screws (D) and remove slip ring assembly.
4. Unscrew set screw (attached video head bar) by using hex wrench (VFK76, 1.5 mm) and remove head bar bushing.
5. Unscrew 2 screws (E) and replace video head bar assembly.

Note:

1. When removing video head bar, be careful not to hit the video head bar by head cylinder or solid materials to prevent the video head tip from damage.
2. Mount brush base plate assembly carefully so that slip ring brush will trace correctly onto slip rings.
3. Video head unit assembly of this model is precisely designed to satisfy rated value only by setting video head bar assembly and slip ring assembly to head drum.

Therefore, no adjustment of video head unit is required.

Video Head Protrusion: 0.040~0.070 mm
Difference of A, B Video Head Protrusion: 0.010 mm or less
Difference of A, B Video Head Height: 0.005 mm or less
A, B Head Azimuth: $\pm$0.0015 mm or less
A, B Head 180° Azimuth: $\pm$0.010 mm or less
Effective Video Head Gap: $0.120^{+0.005}_{-0.015}$ mm

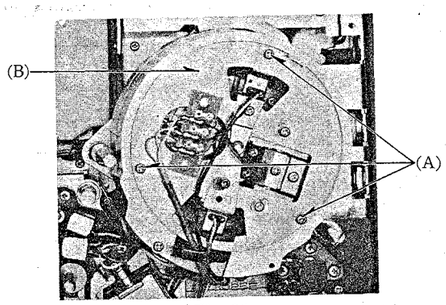


Fig. 26

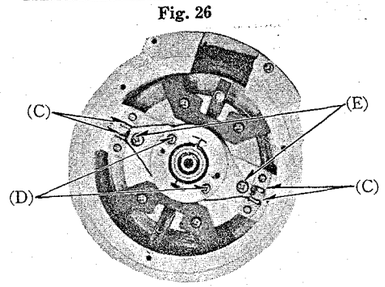
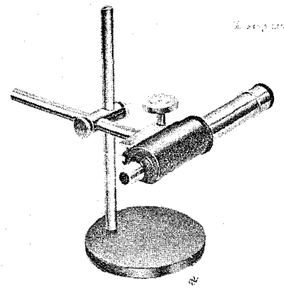
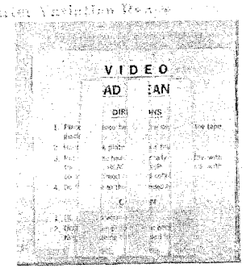


Fig. 27

SERVICING EQUIPMENTS

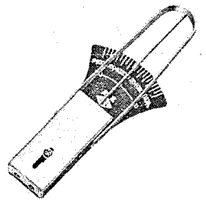


VFK6
Microscope with Stand

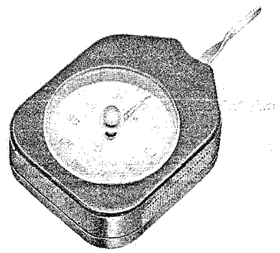


VFK27
Head Cleaner

VFK76
Hex Wrench (ℓ=1.5 mm)



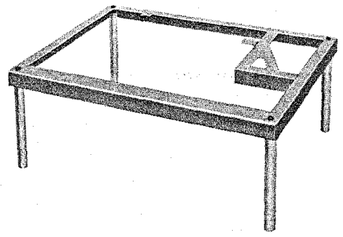
VFK62
Fan Type Tension Gauge (100 gr)



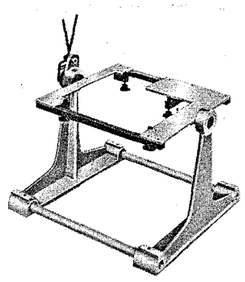
VFK39
Dial Tension Gauge (150 gr)

VFK15
Lapping Tape

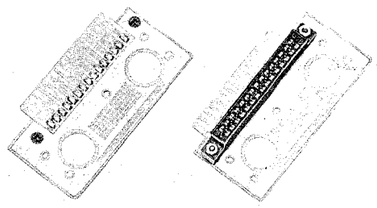
VFK66
Fan Type Tension Gauge (2 kg)



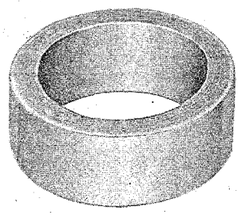
VFK30
Deck Rack



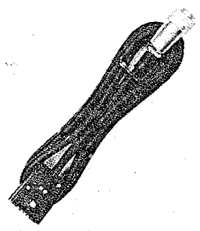
VFK79
Rotary Deck Supporter



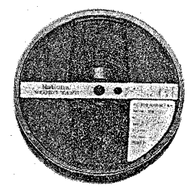
VFK31
Extension Board



VFS1
Splicing Tape



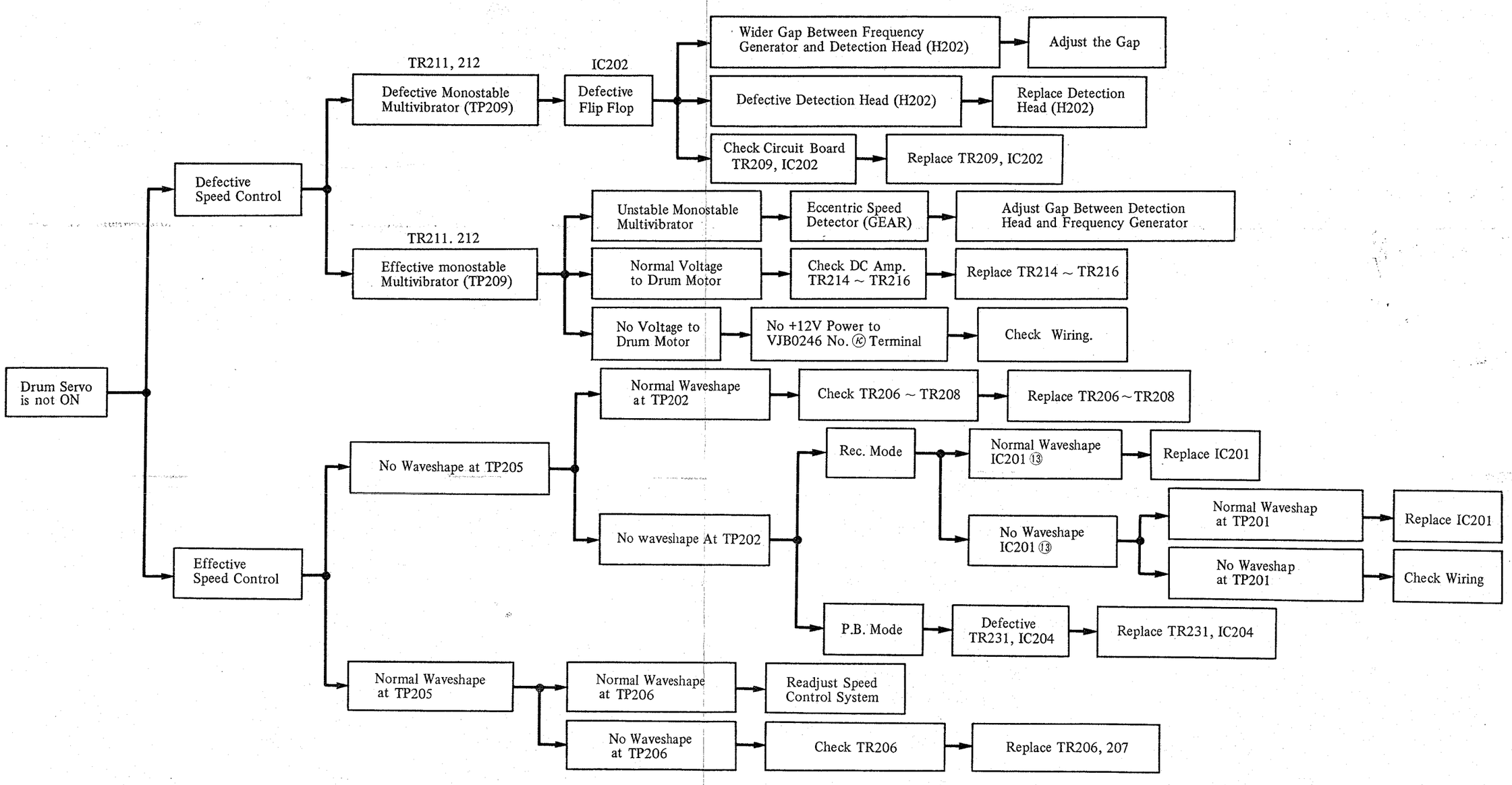
VJA47A
8—10 P Cable VTR Monitor TV Connection Cable (for Portable VTR)



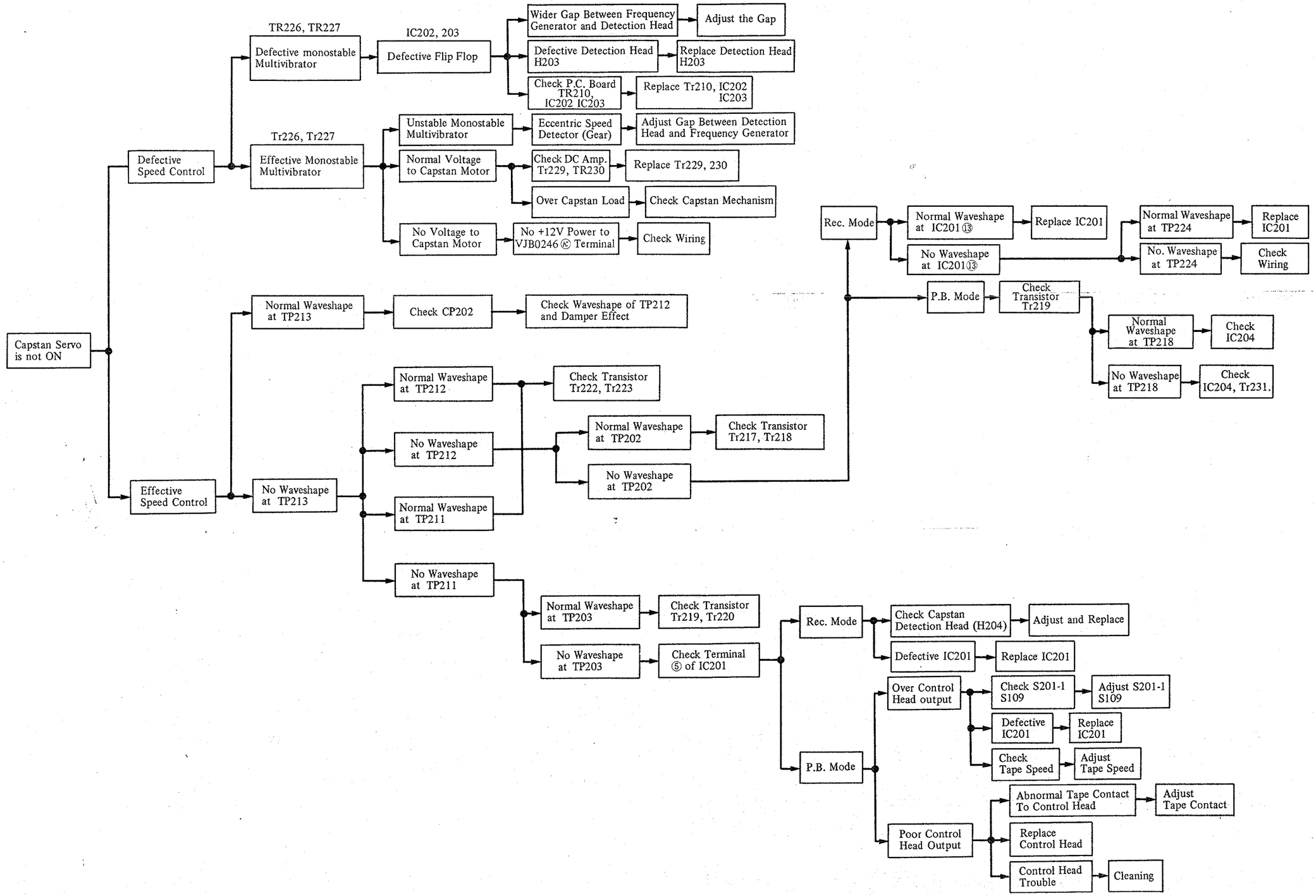
VFM4100/4121
Recorded Reference Tape
* Interchangeability
* Speed Adjustment

TROUBLE SHOOTING GUIDE

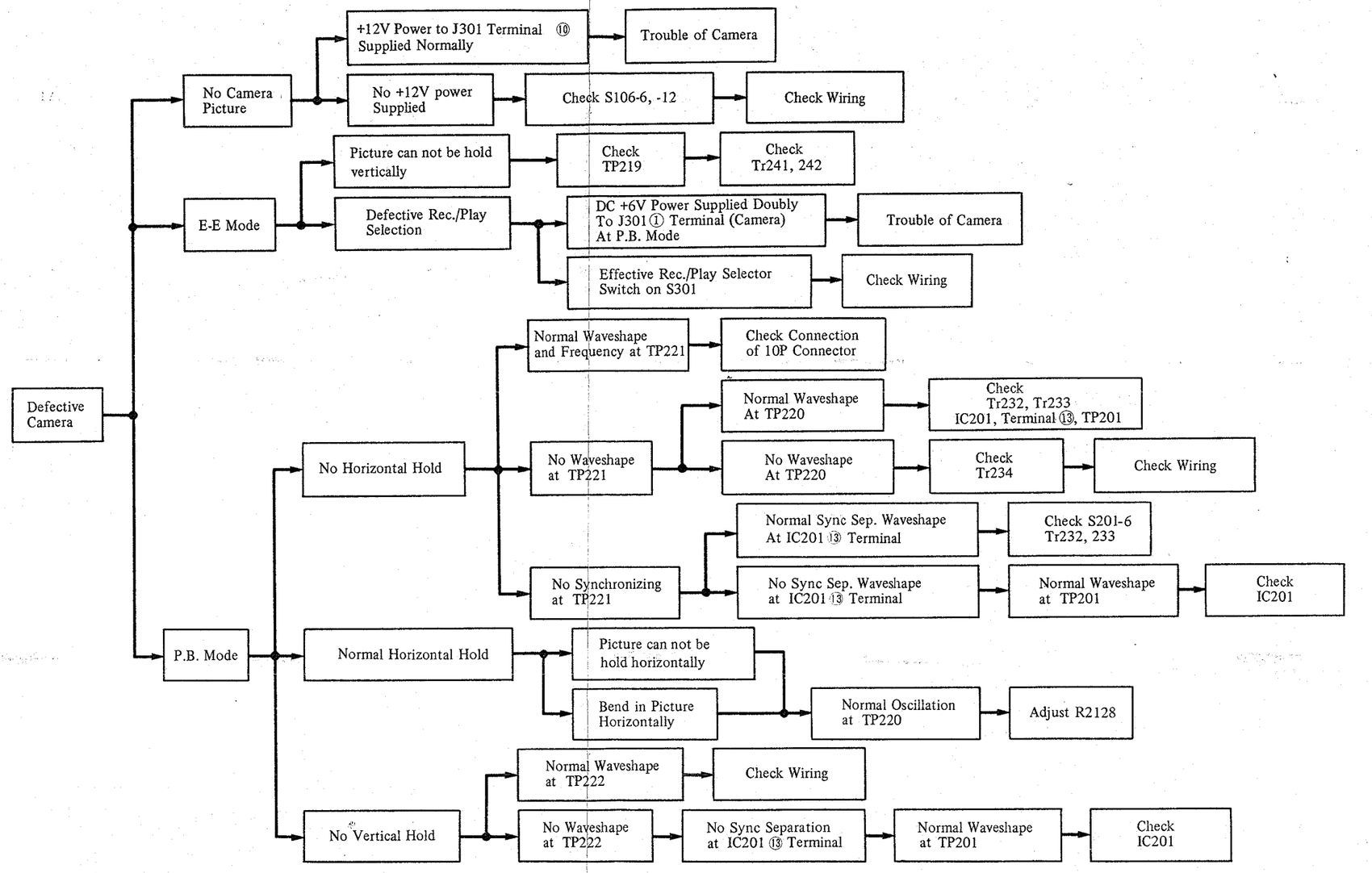
1. TROUBLE IN HEAD DRUM SERVO CONTROL SYSTEM



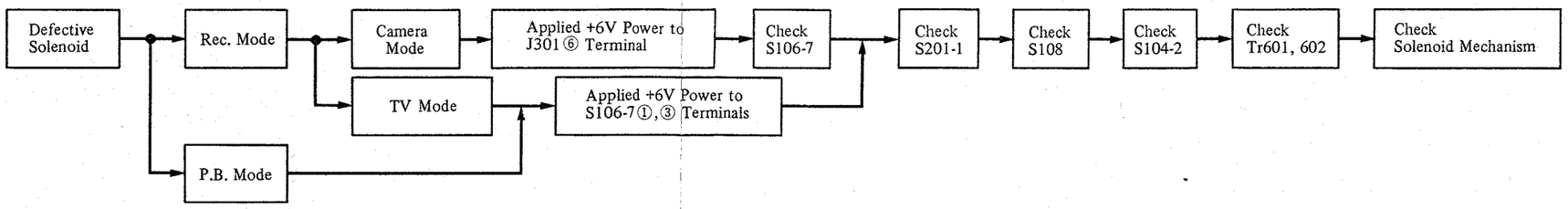
2. TROUBLE IN CAPSTAN SERVO CONTROL SYSTEM



3. TROUBLE IN CAMERA PICTURE

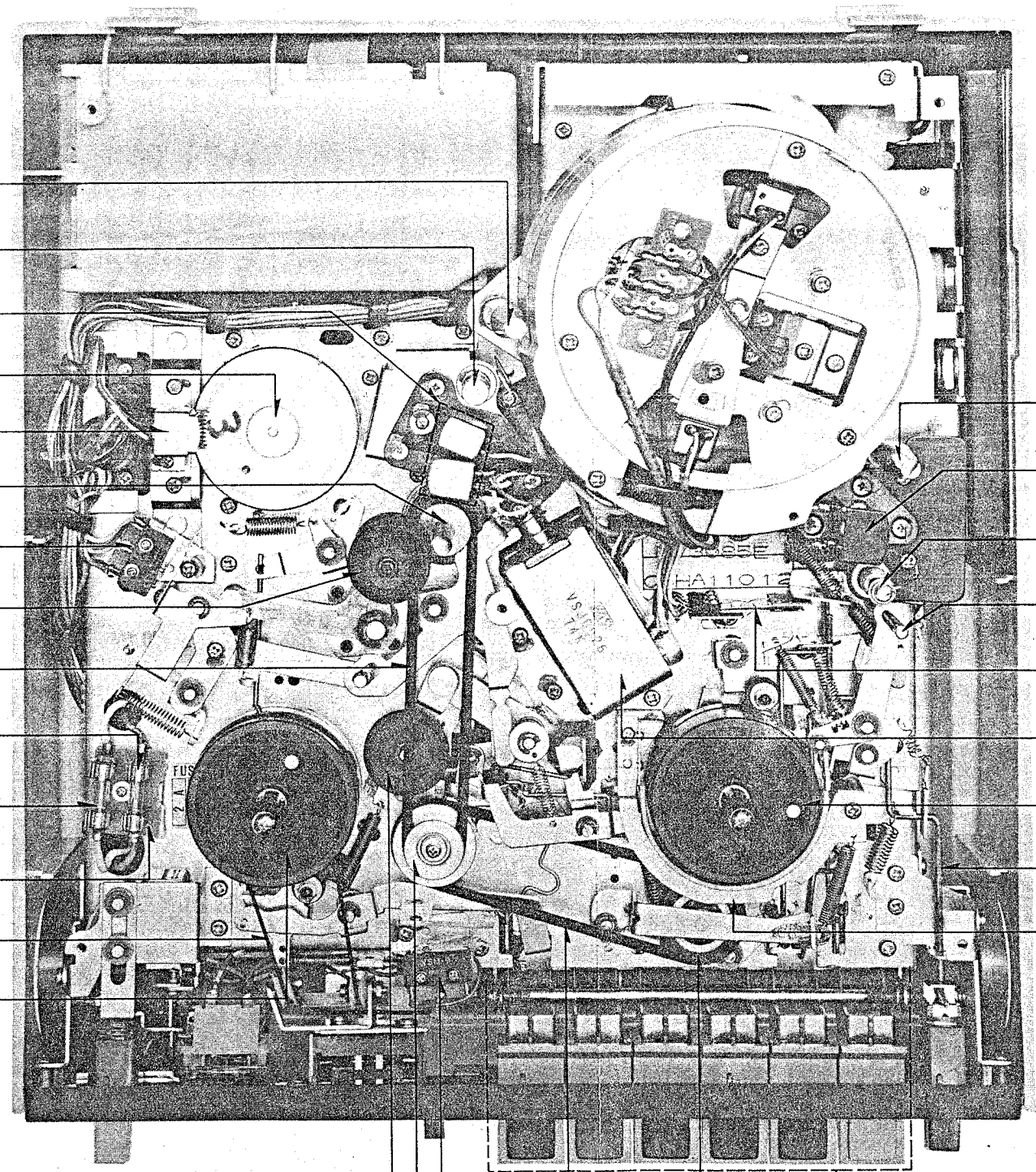

Defective Camera
No Camera Picture
+12V Power to J301 Terminal ⑩ Supplied Normally
Trouble of Camera
No +12V power Supplied
Check S106-6, -12
Check Wiring
E-E Mode
Picture can not be hold vertically
Check TP219
Check Tr241, 242
Defective Rec./Play Selection
DC +6V Power Supplied Doubly To J301① Terminal (Camera) At P.B. Mode
Trouble of Camera
Effective Rec./Play Selector Switch on S301
Check Wiring
No Horizontal Hold
Normal Waveshape and Frequency at TP221
Check Connection of 10P Connector
No Waveshape at TP221
Normal Waveshape At TP220
Check Tr232, Tr233 IC201, Terminal ⑬, TP201
No Waveshape At TP220
Check Tr234
Check Wiring
No Synchronizing at TP221
Normal Sync Sep. Waveshape At IC201 ⑬ Terminal
Check S201-6 Tr232, 233
No Sync Sep. Waveshape at IC201 ⑬ Terminal
Normal Waveshape at TP201
Check IC201
P.B. Mode
Normal Horizontal Hold
Picture can not be hold horizontally
Bend in Picture Horizontally
Normal Oscillation at TP220
Adjust R2128
No Vertical Hold
Normal Waveshape at TP222
Check Wiring
No Waveshape at TP222
No Sync Separation at IC201 ⑬ Terminal
Normal Waveshape at TP201
Check IC201

4. TROUBLE IN PLUNGER TOP VIEW JACK PANEL

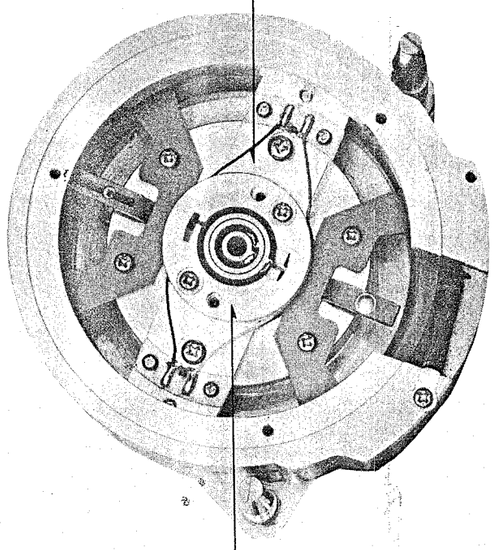


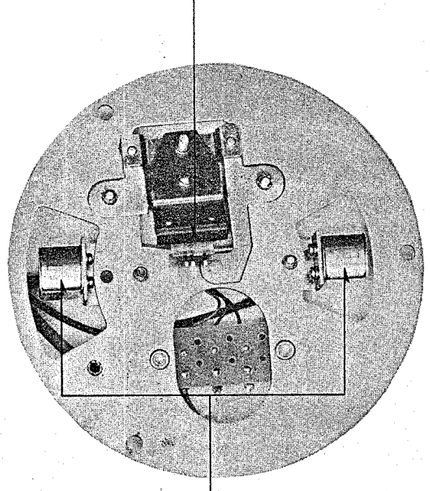
INNER PARTS LOCATION

TOP VIEW

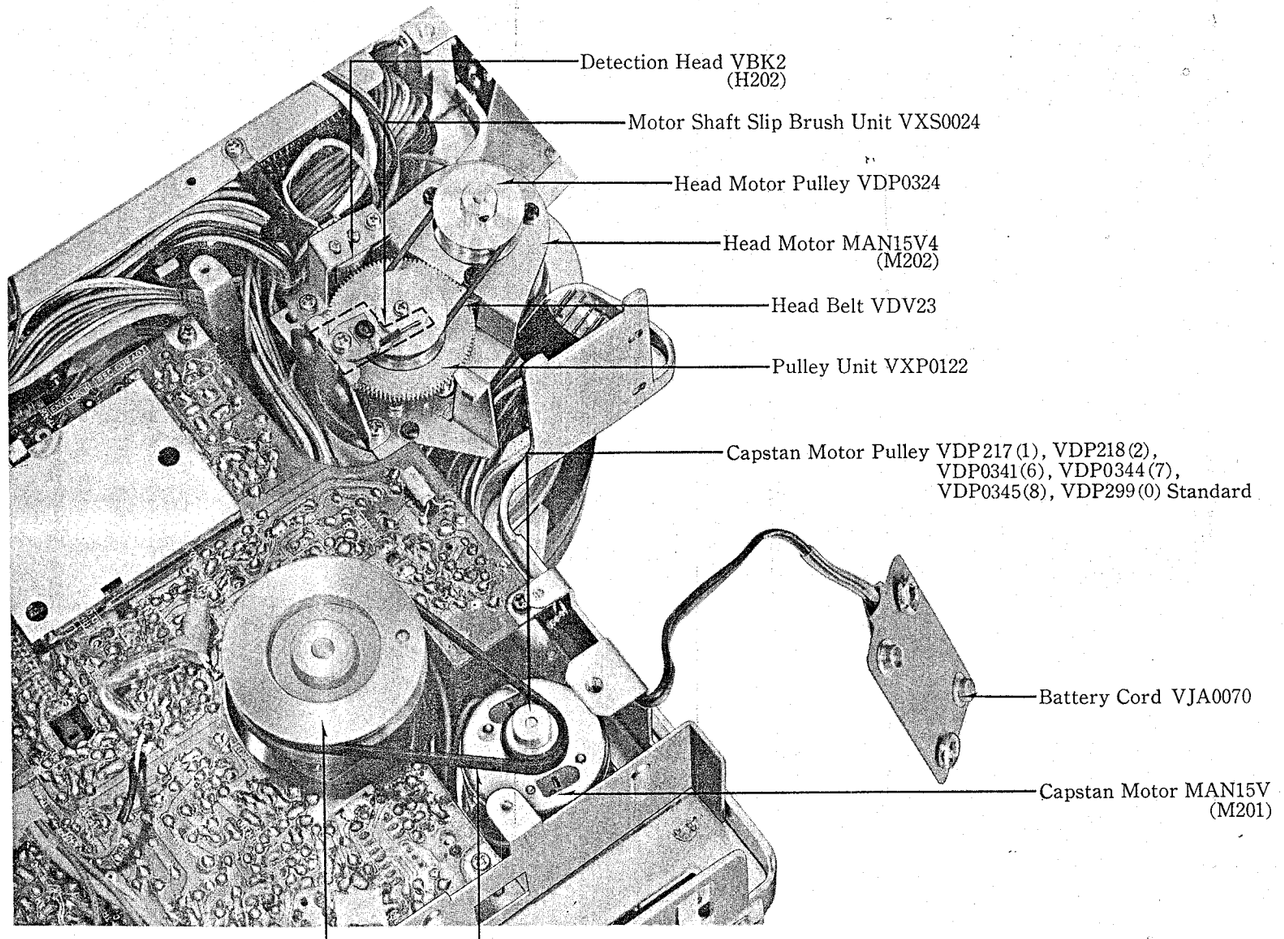


HEAD SECTION

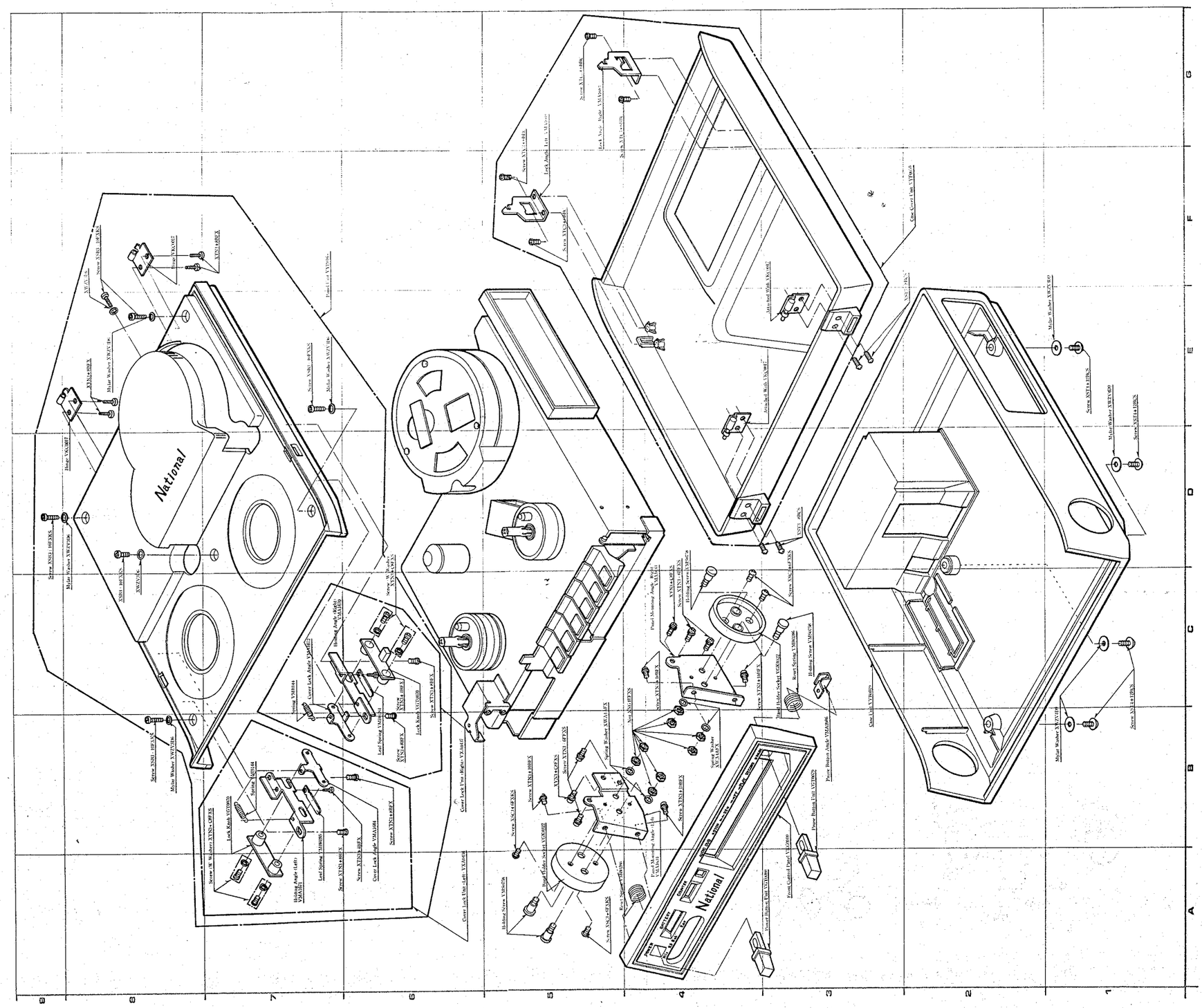


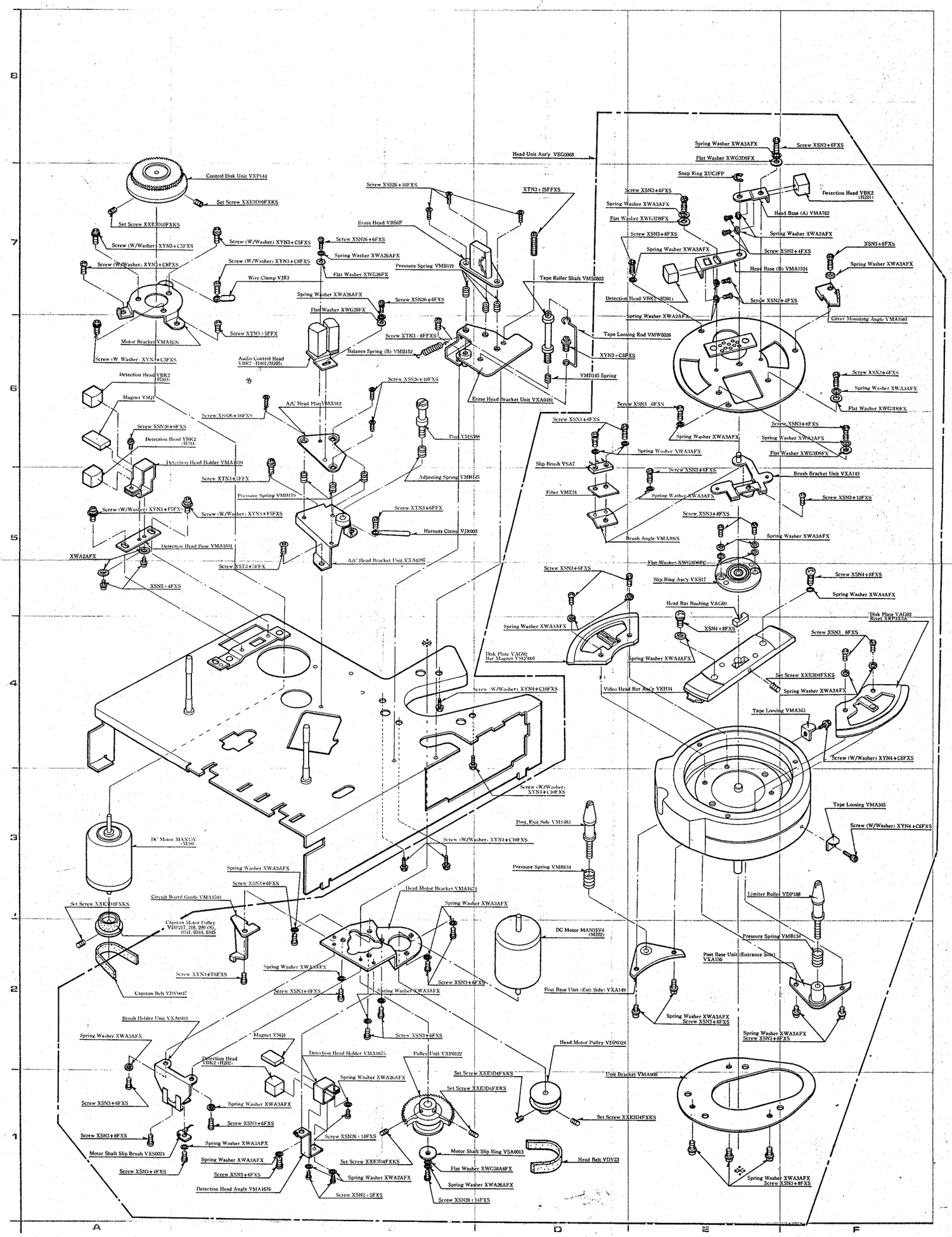


REAR VIEW

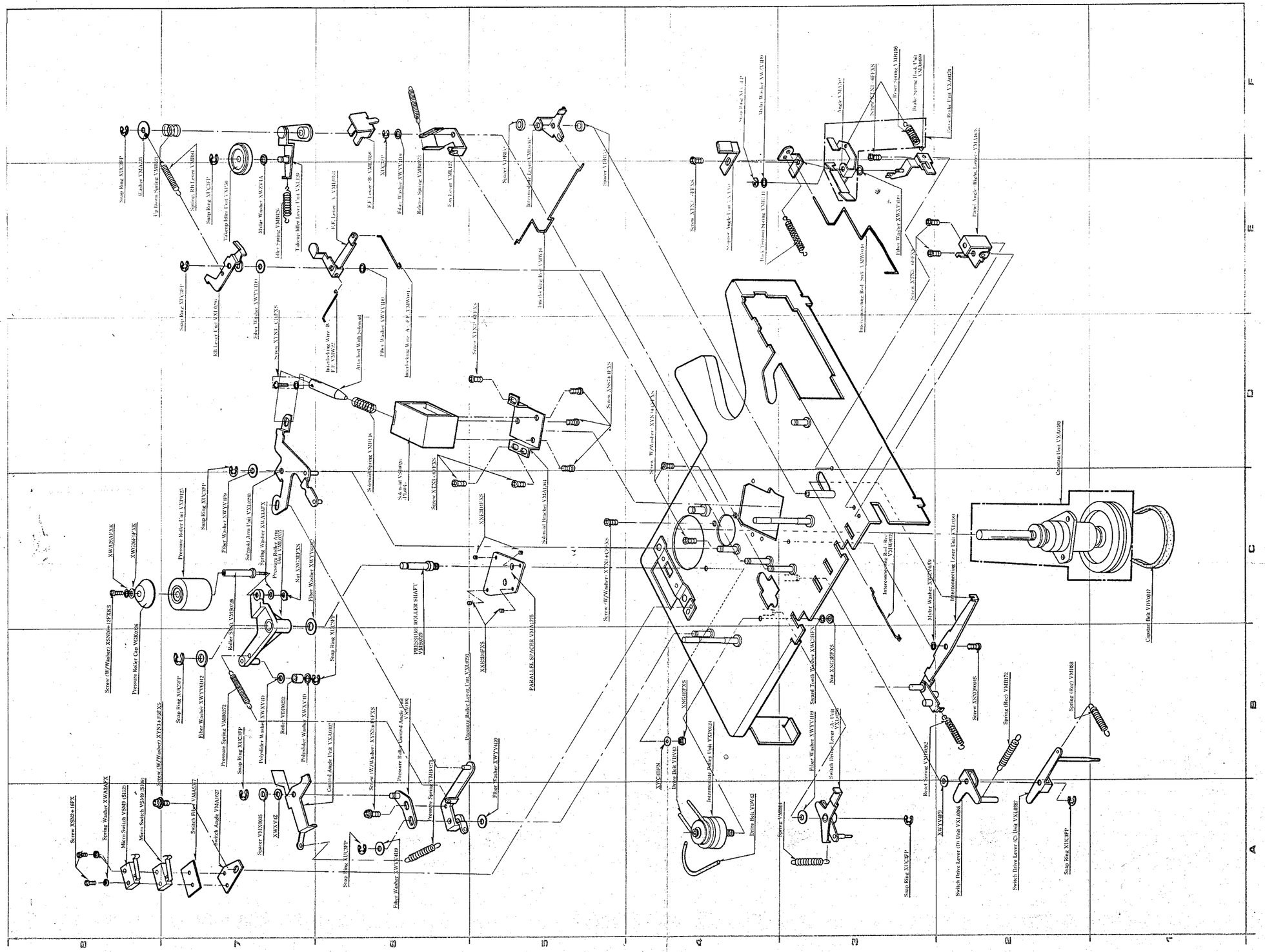


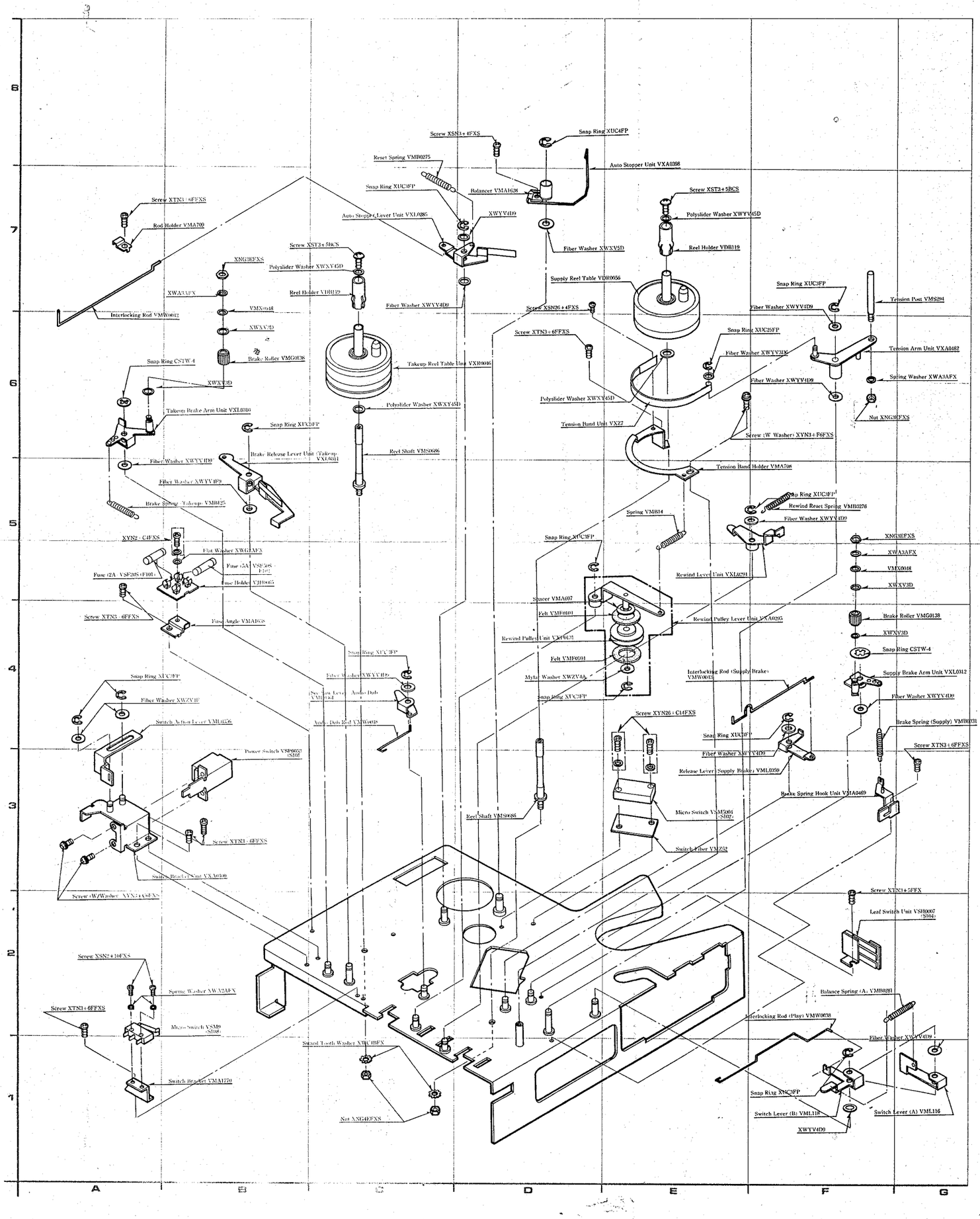
EXPLODED VIEW

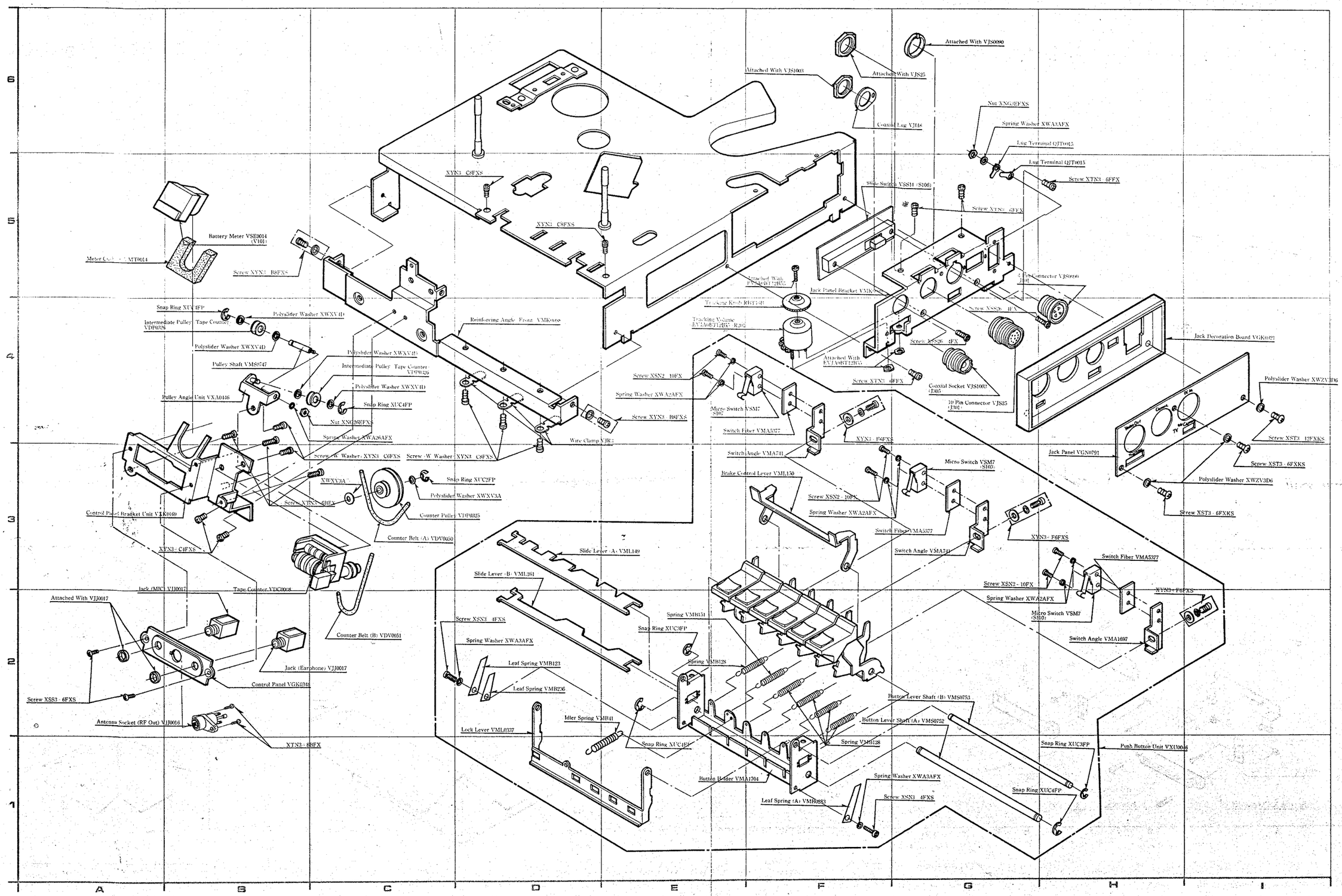

Screw XSH1-10F8XSS
Mylar Washer XW2V106
Screw XSH1-10F8XSS
Mylar Washer XW2V106
Screw XSH1-10F8XSS
Mylar Washer XW2V106

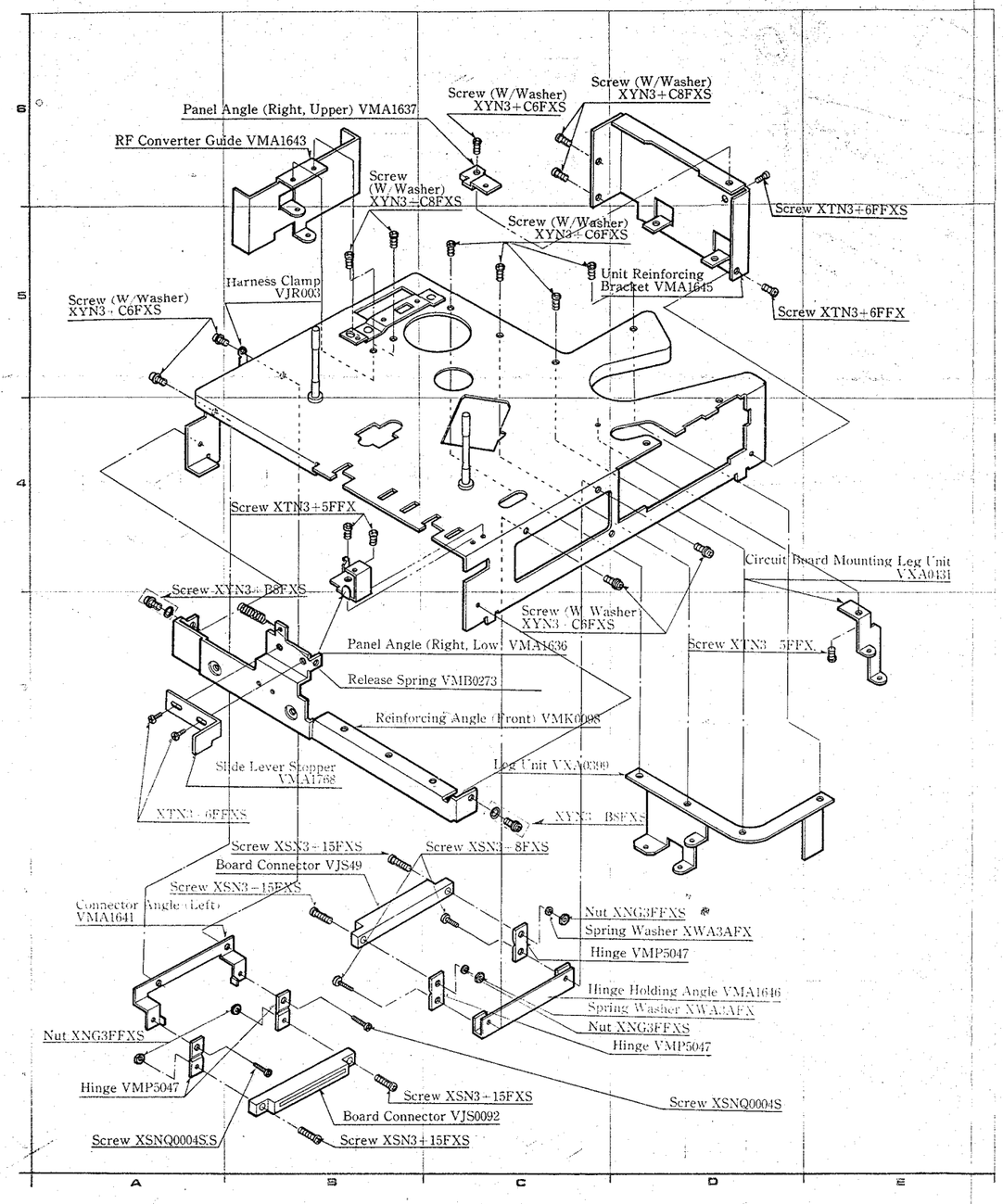

Head Unit Ass'y VEG0068
Control Disk Unit VXP144
Set Screw XXE3D10FXKS
Set Screw XXE3D10FXKS
Screw (W/Washer) XYN3+C5FXS
Screw (W/Washer) XYN3+C8FXS
Screw (W/Washer) XYN3+C5FXS
Screw (W/Washer) XYN3+C8FXS
Wire Clamp VJR3
Motor Bracket VMA1636
Screw (W/Washer) XYN3+C5FXS
Screw XTN3+5FFX
Detection Head VBK2 (H201)
Magnet VSQ1
Screw XSN26+6FXS
Detection Head VBK2 (H201)
Detection Head Holder VMA1629
Screw XTN3+6FFX
Screw (W/Washer) XYN3+F5FXS
Screw (W/Washer) XYN3+F5FXS
Detection Head Base VMA1631
XWA2AFX
Screw XST3+5FFX
XSN2+4FXS
Screw XSS26+10FXS
Erase Head VHS6P
Screw XSN26+6FXS
Spring Washer XWA26AFX
Pressure Spring VMB119
Flat Washer XWG26FX
Spring Washer XWA26AFX
Screw XSN26+6FXS
Flat Washer XWG26FX
Screw XTN3+6FFXS
Balance Spring (B) VMB152
Audio Control Head VHR7 (H101/H205)
Screw XSS26+10FXS
A/C Head Plate VMA912
Screw XSS26+10FXS
Post VMS388
Adjusting Spring VMB145
Pressure Spring VMB119
Screw XTN3+6FFX
Harness Clamp VJR003
A/C Head Bracket Unit VXA0097
XTN3+25FFXS
Tape Roller Shaft VMS0803
Screw XSN3+6FXS
Spring Washer XWA3AFX
Flat Washer XWG3D9FX
Snap Ring XUC3FP
Detection Head VBK2 (H201)
Head Base (A) VMA762
Spring Washer XWA2AFX
Screw XSN3+6FXS
Spring Washer XWA3AFX
Head Base (B) VMA1524
Screw XSN2+4FXS
Detection Head VBK2 (H201)
Spring Washer XWA2AFX
XSN3+6FXS
Spring Washer XWA3AFX
Cover Mounting Angle VMA1681
Tape Looping Rod VMW0026
XYN3+C6FXS
VMB145 Spring
Erase Head Bracket Unit VXA0101
Screw XSN3+6FXS
Spring Washer XWA3AFX
Flat Washer XWG3D9FX
Screw XSN3+6FXS
Spring Washer XWA3AFX
Spring Washer XWA3AFX
Flat Washer XWG3D9FX
Slip Brush VSA7
Screw XSN3+6FXS
Brush Bracket Unit VXA143
Fiber VMZ24
Spring Washer XWA3AFX
Screw XSN3+12FXS
Screw XSN4+8FXS
Brush Angle VMA1015
Spring Washer XWA3AFX
Flat Washer XWG3D9FC
Screw XSN3+6FXS
Slip Ring Ass'y VXS17
Screw XSN4+8FXS
Spring Washer XWA4AFX
Head Bar Bushing VAG69
XSN4+8FXS
Disk Plate VAG92
Bar Magnet VSQ1001
Spring Washer XWA4AFX
Screw XSN3+6FXS
Set Screw XXE3D4FXKS
Spring Washer XWA3AFX
Video Head Bar Ass'y VEH31
Tape Loosing VMA345
Screw (W/Washer) XYN4+C6FXS
Tape Loosing VMA345
Screw (W/Washer) XYN4+C6FXS
Screw (W/Washer) XYN4+C10FXS
Screw (W/Washer) XYN4+C10FXS
Post, Exit Side VMS383
Pressure Spring VMB134
DC Motor MAN15V (VM301)
Spring Washer XWA3AFX
Screw XSN3+6FXS
Circuit Board Guide VMA1703
Head Motor Bracket VMA1674
Spring Washer XWA3AFX
Limiter Roller VDP188
Set Screw XXE3D4FXKS
Capstan Motor Pulley VDP237, 218, 299 (S), 0241, 0244, 0345
DC Motor MAN15V4 (VM202)
Pressure Spring VMB134
Post Base Unit (Entrance Side) VXA150
Screw XYN3+F6FXS
Spring Washer XWA3AFX
Screw XSN3+6FXS
Screw XSN3+6FXS
Spring Washer XWA3AFX
Post Base Unit (Exit Side) VXA149
Capstan Belt VDV0017
Spring Washer XWA3AFX
Screw XSN3+8FXS
Brush Holder Unit VXA0081
Spring Washer XWA3AFX
Magnet VSQ1
Detection Head Holder VMA1675
Pulley Unit VXP0122
Head Motor Pulley VDP0024
Detection Head VBK2 (H202)
Spring Washer XWA26AFX
Unit Bracket VMA900
Set Screw XXE3D4FXKS
Set Screw XXE3D4FXKS
Screw XSN3+6FXS
Spring Washer XWA3AFX
Screw XSN3+6FXS
Set Screw XXE3D4FXKS
Screw XSN3+8FXS
Spring Washer XWA3AFX
Motor Shaft Slip Brush VXS0024
Screw XSN26+14FXS
Motor Shaft Slip Ring VSA0013
Head Belt VDY23
Spring Washer XWA3AFX
Screw XSN3+4FXS
Spring Washer XWA3AFX
Set Screw XXE3D4FXKS
Flat Washer XWG26A6FX
Screw XSN3+6FXS
Spring Washer XWA2AFX
Spring Washer XWA26AFX
Detection Head Angle VMA1676
Screw XSN2+5FXS
Screw XSN26+14FXS
Spring Washer XWA3AFX
Screw XSN3+8FXS

5—4


Snap Ring XUC3FP
Washer YMA235
Up-Down Spring YM834
Spring, Rh Lever YM866
Snap Ring XUC3FP
Thkwsh Idler Lever YM796
Idler Washer XWZ43A
Idler Spring YM812
Thkwsh Idler Lever Unit YM749
F.F. Lever (B) YM1656
XUC3FP
Fiber Washer XWY43FP
Release Spring YM8627
Joint Lever YM1458
Shower YM813
Intermediate Lever YM1067
Shower YM813
Snap Ring XUC3FP
RH Lever Cap YM1896
Fiber Washer XWY43FP
Screw XYN3-08FXS
Interlocking Wire (A) F.F. YM1057
Attached With Solenoid
Fiber Washer XWY43FP
Interlocking Wire (A) F.F. YM1041
F.F. Lever (A) YM1051
Interlocking Rod YM1046
Screw XYN3-08FXS
Screw XYN3-08FXS
Screw XYN3-08FXS
Solenoid Spring YM918
Solenoid YS8005 (Take-up Unit)
Screw XYN3-08FXS
Screw XYN3-08FXS
Screw W/Washer XYS3-08FXS
Screw W/Washer XYS3-08FXS
Screw W/Washer XYS


Screw XSN3+4FXS
Snap Ring XUC4FP
Reset Spring VMH0275
Auto Stopper Unit VXA0398
Snap Ring XUC3FP
Balancer VMA1628
Screw XST3+5BCS
Screw XTN3+6FFXS
Auto Stopper Lever Unit VXL0285
XWYV4D9
Polyslider Washer XWYV45D
Rod Holder VMA709
Fiber Washer XWXV5D
Reel Holder VDB119
Screw XST3+5BCS
XNG3EFXS
Polyslider Washer XWXV45D
Supply Reel Table VDR0056
Snap Ring XUC3FP
XWA3AFX
Reel Holder VDB119
Tension Post VMS294
Fiber Washer XWYV4D9
Screw XSN26+4FXS
VMX0048
Interlocking Rod VMW0042
Screw XTN3+6FFXS
Snap Ring XUC25FP
XWXV3D
Fiber Washer XWYV3D6
Tension Arm Unit VXA0382
Brake Roller VMG0138
Takeup Reel Table Unit VXR0046
Snap Ring CSTW-4
Spring Washer XWA3AFX
XWXV3D
Fiber Washer XWYV4D9
Polyslider Washer XWXV45D
Takeup Brake Arm Unit VXL0310
Nut XNG3EFXS
Tension Band Unit VXZ7
Snap Ring XUC3FP
Polyslider Washer XWXV45D
Screw (W Washer) XYN3+F6FXS
Fiber Washer XWYV4D9
Brake Release Lever Unit (Takeup) VXL0311
Reel Shaft VMS0086
Tension Band Holder VMA708
Brake Spring (Takeup) VMH125
Snap Ring XUC3FP
Rewind Reset Spring VMH0276
Spring VMH14
Fiber Washer XWYV4D9
XYN2+C4FXS
Flat Washer XWG2AFX
Snap Ring XUC3FP
XNG3EFXS
Fuse (2A VSF20S+F10U)
Fuse (5A VSF50S+F15U)
XWA3AFX
Fuse Holder VJH0065
Rewind Lever Unit VXL0291
VMX0048
Screw XTN3+6FFXS
Fuse Angle VMA0658
XWXV3D
Spacer VMA697
Rewind Pulley Lever Unit VXA0295
Brake Roller VMG0138
Felt VMF0101
Rewind Pulley Unit VXA0035
XWXV3D
Snap Ring CSTW-4
Felt VMF0101
Snap Ring XUC3FP
Fiber Washer XWYV4D9
Mylar Washer XWZV4D
Interlocking Rod (Supply Brake) VMW0035
Supply Brake Arm Unit VXL0312
Snap Ring XUC3FP
Fiber Washer XWZV4D
Fiber Washer XWYV4D9
Screw XYN26+C14FXS
Switch Actuator Lever VML0256
Audio Dub Lever VML0264
Audio Dub Rod VMW0028
Snap Ring XUC3FP
Brake Spring (Supply) VMH0231
Power Switch VSP0053 (S105)
Fiber Washer XWYV4D9
Screw XTN3+6FFXS
Release Lever (Supply Brake) VML0359
Brake Spring Hook Unit VXA0469
Micro Switch VSM5004 (S102)
Reel Shaft VMS0086
Screw XTN3+6FFXS
Switch Fiber VMZ52
Switch Bracket Unit VXA0340
Screw (W Washer) XYN3+C6FXS
Screw XTN3+5FFX
Leaf Switch Unit VSH0007 (S104)
Screw XSN2+10FXS
Spring Washer XWA2AFX
Balance Spring (A) VMH0281
Screw XTN3+6FFXS
Micro Switch VSM0 (S108)
Interlocking Rod (Play) VMW0038
Fiber Washer XWYV4D9
Sword Tooth Washer XWC8FX
Switch Bracket VMA1750
Snap Ring XUC3FP
Switch Lever (B) VML118
Switch Lever (A) VML116
Nut XNG4FFXS
XWYV4D9
A
B
C
D
E
F
G
1
2
3
4
5
6
7
8


Attached With VJS0090
Attached With VJS1003
Attached With VJS25
Coaxial Lug VJ118
Nut XNG3FFXS
Spring Washer XWA3AFX
Lug Terminal QJT0015
Lug Terminal QJT0015
Screw XTN3 6FFX
Slide Switch VSS14 (S106)
Screw XTN3 6FFX
XYN3 C8FXS
XYN3 C8FXS
Battery Meter VSE0014 (V101)
Meter Cushion MT0014
Screw XYN3 B8FXS
Attached With EVJA08T12BG
Jack Panel Bracket VMK0469
Tracking Knob R6ET181
Tracking Volume EVJA08T12BG B20K
Screw XSN2 10FX
Screw XSN2 4FX
Screw XTN3 4FFX
Attached With EVJA08T12BG
Coaxial Socket VJS1003 (J305)
10 Pin Connector VJS25 (J301)
Jack Decoration Board VGK0491
Polyslider Washer XWZV3D6
Screw XST4 12FXKS
Screw XST3 6FXKS
Jack Panel VGN0791
Polyslider Washer XWZV3D6
Screw XST3 6FXKS
Snap Ring XUC4FP
Polyslider Washer XWXV4D
Intermediate Pulley Tape Counter VDP0026
Polyslider Washer XWXV4D
Pulley Shaft VMS0747
Intermediate Pulley Tape Counter VDP0026
Polyslider Washer XWXV4D
Pulley Angle Unit VXA0446
Snap Ring XUC4FP
Nut XNG26FFXS
Spring Washer XWA26AFX
Reinforcing Angle Front VMK0469
Wire Clamp VJR3
Screw W Washer XYN3 C6FXS
Screw W Washer XYN3 C8FXS
Screw XSN2 10FX
Spring Washer XWA2AFX
Screw XYN3 B8FXS
Micro Switch VSM7 (S102)
Switch Fiber VMA5377
XYN3 F6FXS
Switch Angle VMA741
Micro Switch VSM7 (S103)
Brake Control Lever VML130
Screw XSN2 10FX
Spring Washer XWA2AFX
Switch Fiber VMA5377
Switch Angle VMA741
XYN3 F6FXS
Switch Fiber VMA5377
Screw XSN2 10FX
Spring Washer XWA2AFX
XYN3 F6FXS
Micro Switch VSM7 (S101)
Switch Angle VMA1697
XWXV3A
Snap Ring XUC2FP
Polyslider Washer XWXV3A
Screw XTN3 6HFX
Counter Pulley VDP0025
Control Panel Bracket Unit VXK0169
Counter Belt (A) VDV0050
XYN3 C4FXS
Slide Lever (A) VML149
Slide Lever (B) VML261
Jack (MIC) VJJ0017
Tape Counter VDC0038
Attached With VJJ0017
Screw XSN3 4FXS
Spring VMB130
Snap Ring XUC3FP
Spring Washer XWA3AFX
Spring VMB128
Leaf Spring VMB123
Leaf Spring VMB236
Jack (Earphone) VJJ0017
Counter Belt (B) VDV0051
Control Panel VGK0368
Screw XSS3 6FXS
Button Lever Shaft (B) VMS0753
Button Lever Shaft (A) VMS0752
Idler Spring VMR41
Antenna Socket (RF Out) VJJ0016
Lock Lever VML0337
Snap Ring XUC4FP
Spring VMB128
Push Button Unit VXU0046
Button Holder VMA1704
Spring Washer XWA3AFX
Snap Ring XUC4FP
Leaf Spring (A) VMR933
Screw XSN3 4FXS
XTN3 8BFX



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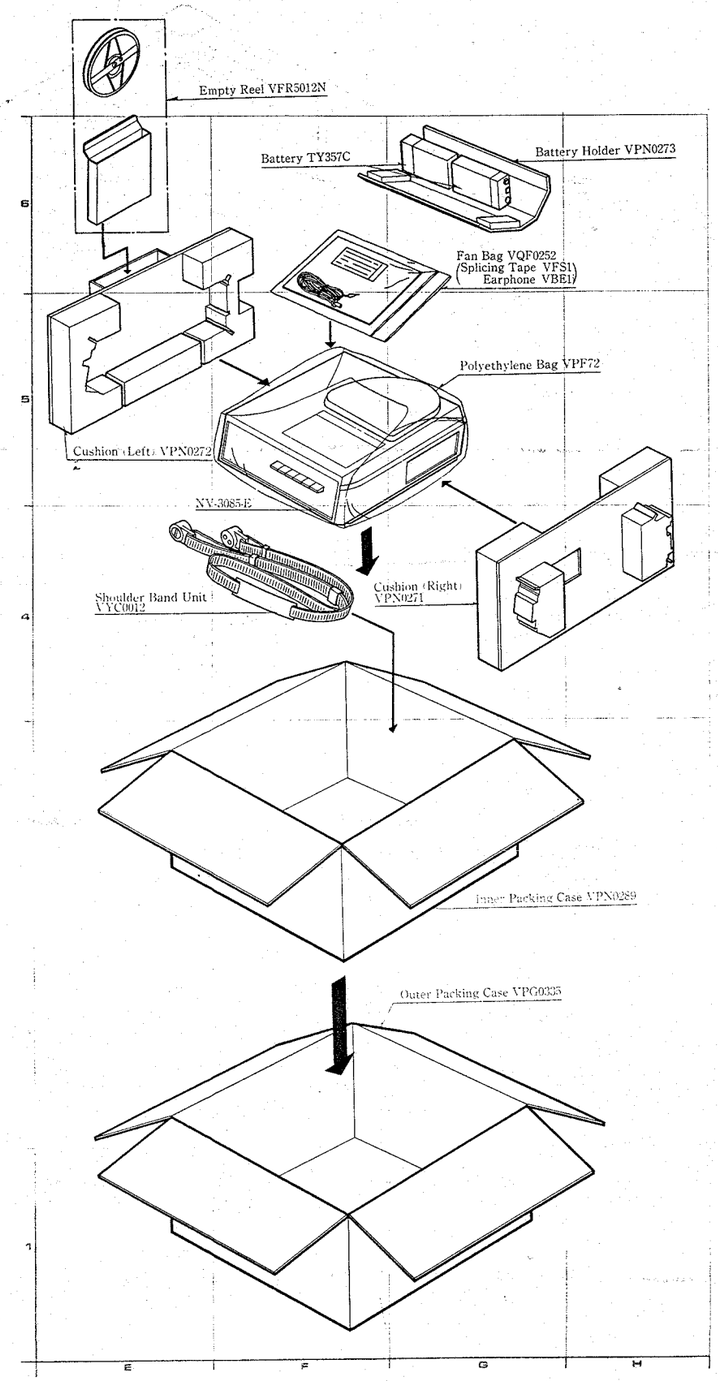
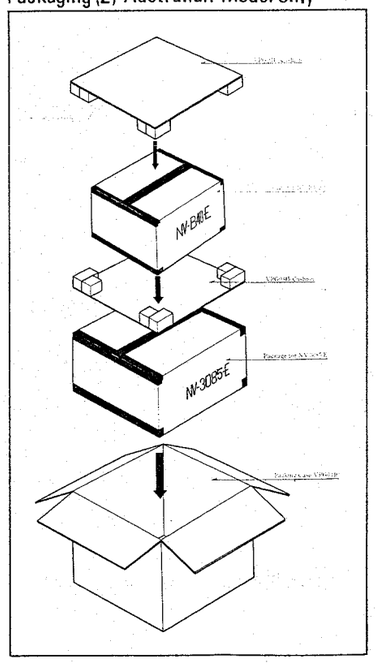


Packaging (2) Australian Model Only



REPLACEMENT PARTS LIST

MECHANICAL PART LIST FOR MODEL NV-3085-E

Note: The page numbers indicated in Ref. Page column are in Exploded View Section (5-3~5-8).

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
3(3-C)	VYB0019	CASE UNIT	1	
		CASE COVER ASSEMBLY		
3(3-F)	VYF0050	CASE COVER UNIT	1	
3(5-G)	VMA1683	LOCK ANGLE (Right)	1	
3(5-F)	VMA1669	LOCK ANGLE (Left)	1	
		FRONT CONTROL PANEL ASSEMBLY		
3(4-B)	VKG0009	FRONT CONTROL PANEL	1	
3(3-A)	VGT0079	PAUSE BUTTON UNIT (Black)	1	
3(3-A)	VGT0080	POWER BUTTON UNIT (Gray)	1	
3(4-C, 5-A)	VGK0322	BAND HOLDER SOCKET	2	
3(4-C)	VMA1633	PANEL MOUNTING ANGLE (Right)	1	
3(5-B)	VMA1634	PANEL MOUNTING ANGLE (Left)	1	
3(3-C, 4-C, 5-A)	VMS0758	HOLDING SCREW	4	
3(3-C, 4-A)	VMB0286	RESET SPRING	2	
3(3-C)	VMA2086	PAUSE BUTTON ANGLE	1	
		PANEL ASSEMBLY		
3(7-E)	VYP0165	PANEL UNIT	1	
3(3-E, 4-E, 8-E, G)	VKC0017	HINGE	2	
3(6-C)	VXA0437	COVER LOCK UNIT (Right)	1	
3(7-C)	VMA1672	COVER LOCK ANGLE (Right)	1	
3(6-C)	VMA1670	HOLDING ANGLE (Right)	1	
3(6-C)	VGT0070	LOCK KNOB	1	
3(6-C)	VMB0284	LEAF SPRING	1	
3(7-B, C)	VMB144	SPRING	2	
3(7-B)	VXA0438	COVER LOCK UNIT (Left)	1	
3(7-B)	VMA1684	COVER LOCK ANGLE (Left)	1	
3(7-B)	VMA1671	HOLDING ANGLE (Left)	1	
3(7-B)	VGT0070	LOCK KNOB	1	
3(7-B)	VMB0285	LEAF SPRING	1	

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
		ERASE HEAD ASSEMBLY		
4(6-D)	VXA0481	ERASE HEAD BRACKET UNIT	1	
4(7-D)	VBS6F	ERASE HEAD	1	
4(6-D)	VMS0803	TAPE POSTER	1	
4(6-D)	VMW0026	TAPE LOOSING ROD	1	
4(7-C, D)	VMB119	PRESSURE SPRING	3	
4(6-D)	VMB145	SPRING	1	
4(6-C)	VMB152	BALANCE SPRING	1	
		AUDIO/CONTROL HEAD ASSEMBLY		
4(5-C)	VXA0397	A/C HEAD BRACKET UNIT	1	
4(6-B)	VBR7	AUDIO/CONTROL HEAD	1	
4(6-C)	VMS388	POST	1	
4(6-C)	VMB145	ADJUSTING SPRING	1	
4(5-B, C)	VMB119	PRESSURE SPRING	3	
4(5-C)	VJR003	HARNESS CLAMP	1	
4(6-B)	VMA912	A/C HEAD PLATE	1	
		DETECTION HEAD ASSEMBLY		
4(5-A)	VMA1631	DETECTION HEAD BASE	1	
4(5-A)	VMA1629	DETECTION HEAD HOLDER	1	
4(5-A, 6-A)	VBK2	DETECTION HEAD	2	
4(6-A)	VSQ1	MAGNET	1	
4	VEG0068	**HEAD UNIT ASSEMBLY**	1	
4(1-E)	VMA900	UNIT BRACKET	1	
4(2-E)	VXA149	POST BASE UNIT, Exit Side	1	
4(2-F)	VXA150	POST BASE UNIT, Entrance Side	1	
4(3-D)	VMS483	POST, Exit Side	1	
4(3-F)	VDP188	LIMITER ROLLER	1	
4(2-F, 3-D)	VMB134	PRESSURE SPRING	2	
4(3-F, 4-F)	VMA345	TAPE LOOSING	2	
4(4-D, F)	VAG92	DISK PLATE	2	
4(4-D)	VSQ5001	BAR MAGNET	2	
4(4-F)	XRP3X5A	RIVET	1	
4(5-E)	VXA143	BRUSH BRACKET UNIT	1	
4(5-D)	VMA391S	BRUSH ANGLE	1	
4(5-D)	VMZ24	FIBER	1	
4(6-D)	VSA7	SLIP RING BRUSH	1	
4(7-F)	VMA1681	COVER MOUNTING ANGLE	1	
4(7-E)	VMA1524	HEAD BASE (B)	1	
4(7-E, F)	VBK2	DETECTION HEAD	2	
4(7-E)	VMA762	HEAD BASE (A)	1	

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
4(4-E)	VEH34	VIDEO HEAD BAR ASSEMBLY	1	
4(4-E)	VAG69	HEAD BAR BUSHING	1	
4(5-E)	VXS17	SLIP RING ASSEMBLY	1	
4(2-C)	VMA1674	HEAD MOTOR BRACKET	1	
4(2-D)	MAN15V4	DC MOTOR	1	
4(1-D)	VDP0324	HEAD MOTOR PULLEY	1	
4(1-D)	VDV23	HEAD BELT	1	
4(1-C)	VXP0122	PULLEY UNIT	1	
4(1-C)	VSA0013	MOTOR SHAFT SLIP RING	1	
4(1-B)	VMA1676	DETECTION HEAD ANGLE	1	
4(1-B)	VMA1675	DETECTION HEAD HOLDER	1	
4(1-B)	VBK2	DETECTION HEAD	1	
4(2-B)	VSQ1	MAGNET	1	
4(2-B)	VXA0403	BRUSH HOLDER UNIT	1	
4(1-B)	VXS0024	MOTOR SHAFT SLIP BRUSH UNIT	1	
4(2-B)	VMA1703	CIRCUIT BOARD GUIDE	1	
		CAPSTAN MOTOR ASSEMBLY		
4(7-A)	VXP144	CONTROL DISK UNIT	1	
4(7-A)	VMA1626	MOTOR BRACKET	1	
4(3-A)	MAN15V	DC MOTOR	1	
4(2-A)	VDP217	CAPSTAN MOTOR PULLEY (1) }	(1)	
4(2-A)	VDP218	CAPSTAN MOTOR PULLEY (2) }	(1)	
4(2-A)	VDP299	CAPSTAN MOTOR PULLEY (0) } Select one of	1	
4(2-A)	VDP0341	CAPSTAN MOTOR PULLEY (6) } these	(1)	
4(2-A)	VDP0344	CAPSTAN MOTOR PULLEY (7) }	(1)	
4(2-A)	VDP0345	CAPSTAN MOTOR PULLEY (8) }	(1)	
4(2-A), 5(1-C)	VDV0047	CAPSTAN BELT	1	
		MICRO SWITCH ASSEMBLY		
5(7-A)	VMA1627	SWITCH ANGLE	1	
5(7-A)	VMA5377	SWITCH FIBER	1	
5(7-A, 8-A)	VSM9	MICRO SWITCH	2	
		PRESSURE ROLLER ASSEMBLY		
5(7-C)	VML0355	PRESSURE ROLLER ARM	1	
5(7-C)	VMS0728	ROLLER SHAFT	1	
5(7-C)	VXP0125	PRESSURE ROLLER UNIT	1	
5(8-C)	VGK0326	CAP, Pressure Roller	1	

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
5(7-B)	VDB0232	ROLLER	1	
5(7-B)	VMB0272	RESET SPRING	1	
5(6-C)	VMS0729	PRESSURE ROLLER SHAFT	1	
5(5-C)	VMA1775	PARALLEL SPACER	1	
		PRESSURE ROLLER CONTROL ASSEMBLY		
5(6-A)	VXA0401	CONTROL ANGLE UNIT (1)	1	
5(7-A)	VXA0402	CONTROL ANGLE UNIT (2)	1	
5(6-A)	VXL0291	ROLLER LEVER UNIT	1	
10 5(7-D)	VXL0290	SOLENOID ARM UNIT	1	
5(6-A)	VMB0271	PRESSURE SPRING	1	
5(6-D)	VSJ0026	SOLENOID	1	
5(5-D)	VMA1364	SOLENOID BRACKET	1	
5(6-D)	VMB148	SOLENOID SPRING	1	
		TAKEUP LEVER ASSEMBLY		
5(7-F)	VXL120	TAKEUP IDLER LEVER UNIT	1	
20 5(7-F)	VXP50	TAKEUP IDLER UNIT	1	
5(7-E)	VMB126	IDLER SPRING	1	
5(7-F)	VMB121	UP-DOWN SPRING	1	
5(8-F)	VMA735	WASHER	1	
			1	
5(3-F)	VXA0470	PAUSE BRAKE UNIT	1	
5(3-F)	VMB106	SPRING	1	
5(7-E)	VXL0296	RB LEVER UNIT	1	
30 5(6-E)	VML0353	FAST FORWARD LEVER (A)	1	
5(6-E)	VMW22	INTERLOCKING WIRE (B), Fast Forward	1	
5(6-E)	VMW0045	INTERLOCKING WIRE (A), Fast Forward	1	
5(7-E)	VMB94	SPRING, RB Lever	1	
5(6-F)	VML0358	FAST FORWARD LEVER (B)	1	
5(6-F)	VML127	FAN TYPE LEVER	1	
5(6-F)	VMB0273	RELEASE SPRING	1	
5(5-E)	VMW16	INTERLOCKING ROD	1	
5(5-F)	VML0362	INTERMEDIATE LEVER	1	
5(5-F)	VDB152	SPACER	2	
40 5(4-F)	VXA269	STOPPER ANGLE UNIT	1	
5(3-F)	VMA702	ANGLE	1	
5(3-E)	VMB144	BACK TENSION SPRING	1	
5(3-E)	VMW0040	INTERCONNECTING ROD, Still	1	
5(3-E, F)	VXA0469	BRAKE SPRING HOOK UNIT	1	
5(2-E)	VMA1636	PANEL ANGLE (Right, Lower)	1	
5(2-C)	VXA0480	CAPSTAN UNIT	1	
5(2-B)	VXL0289	INTERCONNECTING LEVER UNIT	1	
5(3-C)	VMW0039	INTERCONNECTING ROD (Record)	1	
5(2-B)	VMB0282	RESET SPRING	1	

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
		SWITCH DRIVE LEVER ASSEMBLY		
5(3-A)	VXL0286	SWITCH DRIVE LEVER (A) UNIT	1	
5(2-A)	VXL0287	SWITCH DRIVE LEVER (C) UNIT	1	
5(2-A)	VXL0288	SWITCH DRIVE LEVER (D) UNIT	1	
5(3-A)				
5(3-A)	VMB14	SPRING	1	
5(2-B)	VMB172	SPRING (F.F. Select)	1	
5(1-B)	VMB88	SPRING (Slide Lever)	1	
5(4-A)	VXP0124	INTERMEDIATE PULLEY UNIT	1	
5(4-A)	VDV43	DRIVE BELT (Capstan, Rewind Idler)	2	
		AUTO STOPPER ASSEMBLY		
6(7-D)	VXA0398	AUTO STOPPER UNIT	1	
6(7-D)	VXL0285	AUTO STOPPER LEVER UNIT	1	
6(7-C)	VMB0275	RESET SPRING	1	
6(7-A)	VMW0042	INTERLOCKING ROD	1	
6(7-A)	VMA709	ROD HOLDER	1	
6(7-D)	VMA1628	BALANCER	1	
		TENSION ARM ASSEMBLY		
6(6-F)	VXA0482	TENSION ARM UNIT	1	
6(7-F)	VMS294	TENSION POST	1	
		TENSION BAND ASSEMBLY		
6(6-E)	VXZ7	TENSION BAND UNIT	1	
6(6-E)	VMA708	TENSION BAND HOLDER	1	
6(5-E)	VMB14	SPRING	1	
		REWIND PULLEY LEVER ASSEMBLY		
6(4-E)	VXA0295	REWIND PULLEY LEVER UNIT	1	
6(4-E)	VXP0131	REWIND PULLEY UNIT	1	
6(4-E)	VMF0104	FELT	2	
6(5-F)	VXL0294	REWIND LEVER UNIT	1	
6(5-F)	VMB0276	REWIND RESET SPRING	1	
6(3-E)	VSM5004	MICRO SWITCH	1	
6(3-E)	VMZ52	SWITCH FIBER	1	
6(4-C)	VML0361	SEE-SAW LEVER (Audio Dub)	1	
6(4-C)	VMW0048	AUDIO DUB ROD	1	

	Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
			SWITCH LEVER ASSEMBLY		
	6(1-G)	VML116	SWITCH LEVER (A)	1	
	6(1-F)	VML118	SWITCH LEVER (B)	1	
	6(1-F)	VMW0038	INTERLOCKING ROD (Play)	1	
	6(2-G)	VMB0281	BALANCE SPRING (A)	1	
	6(2-F)	VSH0007	LEAF SWITCH	1	
10					
			SUPPLY REEL TABLE ASSEMBLY		
	6(7-E)	VDR0056	SUPPLY REEL TABLE	1	
	6(7-E)	VDB119	REEL HOLDER	1	
	6(3-D)	VMS0686	REEL SHAFT	1	
			TAKEUP REEL TABLE ASSEMBLY		
	6(6-C)	VXR0046	TAKEUP REEL TABLE UNIT	1	
20	6(7-C)	VDB119	REEL HOLDER	1	
	6(6-C)	VMS0686	REEL SHAFT	1	
			BRAKE ASSEMBLY		
	6(6-A)	VXL0310	TAKEUP BRAKE ARM UNIT	1	
	6(4-F)	VXL0312	SUPPLY BRAKE ARM UNIT	1	
	6(4-F, 6-B)	VMG0138	BRAKE ROLLER	2	
	6(5-A)	VMB125	BRAKE SPRING (Takeup)	1	
30	6(4-F)	VMB0331	BRAKE SPRING (Supply)	1	
	6(5-B)	VXL0311	BRAKE RELEASE LEVER UNIT (Takeup)	1	
	6(4-F)	VML0359	BRAKE RELEASE LEVER (Supply)	1	
	6(4-F)	VMW0043	INTERLOCKING ROD (Supply Brake)	1	
	6(5-F, 6-B)	VMX0048	PRESSURE WASHER	2	
			MICRO SWITCH ASSEMBLY		
40	6(2-A)	VSM9	MICRO SWITCH	1	
	6(1-A)	VMA1770	SWITCH BRACKET	1	
			POWER SWITCH ASSEMBLY		
	6(3-A)	VXA0400	SWITCH BRACKET UNIT	1	
	6(3-A)	VML0356	SWITCH ACTION LEVER	1	
	6(3-B)	VSP0053	POWER SWITCH	1	

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
6(5-B)	VJH0065	FUSE HOLDER	1	
6(4-B)	VMA1638	FUSE ANGLE	1	
6(5-A)	VSF20S	FUSE (2A)	1	
6(5-B)	VSF50S	FUSE (5A)	1	
		CONTROL PANEL ASSEMBLY		
7(3-B)	VXK0169	CONTROL PANEL BRACKET UNIT	1	
10 7(4-B)	VXA0446	PULLEY ANGLE UNIT	1	
7(4-B)	VMS0747	PULLEY SHAFT	1	
7(4-B, C)	VDP0326	INTERMEDIATE PULLEY (Tape Counter)	2	
7(3-B)	VDP0325	COUNTER PULLEY	1	
7(3-C)	VDV0050	COUNTER BELT (A)	1	
7(3-C)	VDV0051	COUNTER BELT (B)	1	
7(3-C)	VDC0008	TAPE COUNTER	1	
7(2-B)	VJJ0017	JACK (Mic, Earphone)	2	
7(2-B)	VJJ0016	SOCKET (RF Out)	1	
7(5-B)	VSE0014	BATTERY METER	1	
20 7(2-B)	VGK0348	CONTROL PANEL	1	
7(5-B)	VMT0014	METER CUSHION	1	
7(5-C)	VMK0098	REINFORCING ANGLE (Front)	1	
7(4-D)	VJR3	WIRE CLAMP	3	
		PUSH BUTTON ASSEMBLY		
7	VXU0046	PUSH BUTTON UNIT	1	
7(2-E)	VMA1704	BUTTON HOLDER	1	
30 7(1-D)	VML0337	LOCK LEVER	1	
7(2-D)	VML261	SLIDE LEVER (B)	1	
7(3-D)	VML149	SLIDE LEVER (A)	1	
7(3-F)	VML150	BRAKE CONTROL LEVER	1	
7(2-G)	VMS0753	BUTTON LEVER SHAFT (B)	1	
7(1-G)	VMS0752	BUTTON LEVER SHAFT (A)	1	
7(1-F)	VMB0283	LEAF SPRING (A)	1	
7(2-F)	VMB128	SPRING	5	
7(2-F)	VMB151	SPRING	1	
7(2-E)	VMB41	IDLER SPRING	1	
40 7(2-D)	VMB123	LEAF SPRING	1	
7(2-D)	VMB236	LEAF SPRING	1	
7(2-H)	VMA1697	SWITCH ANGLE	1	
7(3-G, 4-F)	VMA741	SWITCH ANGLE	2	
7(3-G, H, 4-F)	VMA5377	SWITCH FIBER	3	
7(3-G, H, 4-F)	VSM7	MICRO SWITCH	3	

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
		JACK PANEL ASSEMBLY		
7(5-G)	VMK0099	JACK PANEL BRACKET	1	
7(4-H)	VGK0321	JACK DECORATION BOARD	1	
7(4-H)	VGN0791	JACK PANEL	1	
7(5-H)	VJS0090	4 PIN CONNECTOR	1	
7(4-G)	VJS25	10 PIN CONNECTOR	1	
7(4-G)	VJS1003	COAXIAL SOCKET	1	
7(5-G)	QJT0015	LUG TERMINAL	1	
7(6-F)	VJH8	COAXIAL LUG	1	
7(5-F)	VSS14	SLIDE SWITCH	1	
7(4-F)	RBT16B	TRACKING KNOB	1	
7(4-F)	EVJAOBT12B55	TRACKING VOLUME	1	
8(6-B)	VMA1643	RF CONVERTER GUIDE	1	
8(3-A)	VMK0098	REINFORCING ANGLE (Front)	1	
8(4-B)	VMA1636	PANEL ANGLE (Right, Lower)	1	
8(2-A)	VMA1641	CONNECTOR ANGLE (Left)	1	
8(1-A, B, C, 2-C)	VMP5047	HINGE	4	
8(1-B)	VJS0092	BOARD CONNECTOR	1	
8(2-B)	VJS49	BOARD CONNECTOR	1	
8(1-C)	VMA1646	HINGE HOLDING ANGLE	1	
8(2-D)	VXA0399	LEG UNIT	1	
8(3-E)	VXA0431	CIRCUIT BOARD MOUNTING LEG UNIT	1	
8(6-C)	VMA1637	PANEL ANGLE (Right, Upper)	1	
8(6-D)	VMA1645	UNIT REINFORCING BRACKET	1	
8(5-B)	VJR003	HARNESS CLAMP	1	
8(3-A)	VMA1768	SLIDE LEVER STOPPER	1	
		PACKAGING		
8(2-F)	VPG0335	OUTER PACKING CASE	1	
8(3-F)	VPN0289	INNER PACKING CASE	1	
8(4-F)	VYC0012	SHOULDER BAND UNIT	1	
8(4-G)	VPN0271	CUSHION (Right)	1	
8(5-E)	VPN0272	CUSHION (Left)	1	
8(5-G)	VPF72	POLYETYLENE BAG	1	
8(6-G)	VQF0252	FAN BAG	1	
8(6-G)	VFS1	SPLICING TAPE	1	
8(6-G)	VBE1	EARPHONE	1	
8(6-E)	VFR5012N	EMPTY REEL	1	
8(6-G)	VPN0273	BATTERY HOLDER	1	
8(6-G)	TY-357C	BATTERY	2	
8	VQL242	BATTERY CAUTION LABEL	4	
8	VPG0345	CUSHION (Australian Model Only)	2	
8	VPG0346	PACKING CASE	1	

MECHANICAL PART LIST FOR MODEL NV-3085-E

(ALPHABETICAL ORDER INDEX)

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
7(4-F)	EVJAOBT12B55	TRACKING CONTROL	1	
4(3-A)	MAN15V	DC MOTOR (CAPSTAN)	1	
4(2-D)	MAN15V4	DC MOTOR (HEAD)	1	
7(5-G)	QJT0015	LUG TERMINAL	1	
7(4-F)	RBT16B	TRACKING KNOB	1	
8(6-G)	TY-357C	BATTERY	2	
4(4-E)	VAG69	HEAD BAR BUSHING	1	
4(4-D, F)	VAG92	DISK PLATE	2	
8(6-G)	VBE1	EARPHONE	1	
4(1-B), (6-A), (5-A), (7-E, F)	VBK2	DETECTION HEAD	5	
4(7-D)	VBS6F	ERASE HEAD	1	
4(6-B)	VBR7	AUDIO/CONTROL HEAD	1	
5(7-B)	VDB0232	ROLLER	1	
6(7-C), (7-E)	VDB119	REEL HOLDER	2	
5(5-F)	VDB152	SPACER	2	
7(3-C)	VDC0008	TAPE COUNTER	1	
4(1-D)	VDP0324	HEAD MOTOR PULLEY	1	
7(3-B)	VDP0325	COUNTER PULLEY	1	
7(4-B, C)	VDP0326	INTERMEDIATE PULLEY (Tape Counter)	2	
4(2-A)	VDP0341	CAPSTAN MOTOR PULLEY (6)	(1)	
4(2-A)	VDP0344	CAPSTAN MOTOR PULLEY (7)	(1)	
4(2-A)	VDP0345	CAPSTAN MOTOR PULLEY (8)	(1)	
4(2-A)	VDP217	CAPSTAN MOTOR PULLEY (1)	(1)	
4(2-A)	VDP218	CAPSTAN MOTOR PULLEY (2)	(1)	
4(2-A)	VDP299	CAPSTAN MOTOR PULLEY (0)	1	
4(3-F)	VDP188	LIMITER ROLLER	1	
6(7-E)	VDR0056	SUPPLY REEL TABLE	1	
4(2-A), 5(1-C)	VDV0047	CAPSTAN BELT	1	
7(3-C)	VDV0050	COUNTER BELT (A)	1	
7(3-C)	VDV0051	COUNTER BELT (B)	1	
4(1-D)	VDV23	HEAD BELT	1	
5(4-A)	VDV43	DRIVE BELT	2	
4	VEG0068	HEAD UNIT ASSEMBLY	1	
4(4-E)	VEH34	VIDEO HEAD BAR ASSEMBLY	1	
8(6-E)	VFR5012N	EMPTY REEL	1	
8(6-G)	VFS1	SPLICING TAPE	1	
7(4-H)	VGK0321	JACK DECORATION BOARD	1	
3(5-A, 4-C)	VGK0322	BAND HOLDER SOCKET	2	
5(8-C)	VGK0326	CAP, Pressure Roller	1	
7(2-B)	VGK0348	CONTROL PANEL	1	

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Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
7(4-H)	VGN0791	JACK PANEL	1	
3(6-C), (7-B)	VGT0070	LOCK KNOB	2	
3(3-A)	VGT0079	PAUSE BUTTON UNIT	1	
3(3-A)	VGT0080	POWER BUTTON UNIT	1	
6(5-B)	VJH0065	FUSE HOLDER	1	
7(6-F)	VJH8	COAXIAL LUG	1	
7(2-B)	VJJ0016	SOCKET (RF Out)	1	
7(2-B)	VJJ0017	JACK (Mic, Earphone)	2	
4(5-C), 8(5-B)	VJR003	HARNESS CLAMP	2	
7(4-D)	VJR3	WIRE CLAMP	3	
7(5-H)	VJS0090	4 PIN CONNECTOR	1	
8(1-B)	VJS0092	BOARD CONNECTOR	1	
7(4-G)	VJS1003	COAXIAL SOCKET	1	
7(4-G)	VJS25	10 PIN CONNECTOR	1	
8(2-B)	VJS49	BOARD CONNECTOR	1	
3(3-E, 4-E, 8-E, G)	VKC0017	HINGE	2	
3(4-B)	VKG0009	FRONT CONTROL PANEL	1	
5(5-D)	VMA1364	SOLENOID BRACKET	1	
4(7-E)	VMA1524	HEAD BASE (B)	1	
4(7-A)	VMA1626	MOTOR BRACKET	1	
5(7-A)	VMA1627	SWITCH ANGLE	1	
6(7-D)	VMA1628	BALANCER	1	
4(5-A)	VMA1629	DETECTION HEAD HOLDER	1	
4(5-A)	VMA1631	DETECTION HEAD BASE	1	
3(4-C)	VMA1633	PANEL MOUNTING ANGLE (Right)	1	
3(5-B)	VMA1634	PANEL MOUNTING ANGLE (Left)	1	
5(2-E)	VMA1636	PANEL ANGLE (Right, Lower)	1	
8(6-C)	VMA1637	PANEL ANGLE (Right, Upper)	1	
6(4-B)	VMA1638	FUSE ANGLE	1	
8(2-A)	VMA1641	CONNECTOR ANGLE (Left)	1	
8(6-B)	VMA1643	RF CONVERTER GUIDE	1	
8(6-D)	VMA1645	UNIT REINFORCING BRACKET	1	
8(1-C)	VMA1646	HINGE HOLDING ANGLE	1	
3(5-F)	VMA1669	LOCK ANGLE (Left)	1	
3(6-C)	VMA1670	HOLDING ANGLE (Right)	1	
3(7-B)	VMA1671	HOLDING ANGLE (Left)	1	
3(7-C)	VMA1672	COVER LOCK ANGLE (Right)	1	
4(2-C)	VMA1674	HEAD MOTOR BRACKET	1	
4(1-B)	VMA1675	DETECTION HEAD HOLDER	1	
4(1-B)	VMA1676	DETECTION HEAD ANGLE	1	
4(7-F)	VMA1681	COVER MOUNTING ANGLE	1	
3(5-G)	VMA1683	LOCK ANGLE (Right)	1	
3(7-B)	VMA1684	COVER LOCK ANGLE (Left)	1	
7(2-H)	VMA1697	SWITCH ANGLE	1	

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
4(2-B)	VMA1703	CIRCUIT BOARD GUIDE	1	
7(2-E)	VMA1704	BUTTON HOLDER	1	
8(3-A)	VMA1768	SLIDE LEVER STOPPER	1	
6(1-A)	VMA1770	SWITCH BRACKET	1	
5(5-C)	VMA1775	PARALLEL SPACER	1	
3(3-C)	VMA2086	PAUSE BUTTON ANGLE	1	
4(3-F, 4-F)	VMA345	TAPE LOOSING	2	
4(5-D)	VMA391S	BRUSH ANGLE	1	
5(7-A), 7(3-G, H, 4-F)	VMA5377	SWITCH FIBER	4	
6(4-E)	VMA697	SPACER	1	
5(3-F)	VMA702	ANGLE	1	
6(6-E)	VMA708	TENSION BAND HOLDER	1	
6(7-A)	VMA709	ROD HOLDER	1	
5(8-F)	VMA735	WASHER	1	
7(3-G, 4-F)	VMA741	SWITCH ANGLE	2	
4(7-E)	VMA762	HEAD BASE (A)	1	
4(1-E)	VMA900	UNIT BRACKET	1	
4(6-B)	VMA912	A/C HEAD PLATE	1	
5(6-A)	VMB0271	PRESSURE SPRING	1	
5(7-B)	VMB0272	RESET SPRING	1	
5(6-F), 8(3-E)	VMB0273	RELEASE SPRING	2	
6(7-C)	VMB0275	RESET SPRING	1	
6(5-F)	VMB0276	RESET SPRING, Rewind	1	
6(2-G)	VMB0281	BALANCE SPRING (A)	1	
5(2-B)	VMB0282	RESET SPRING	1	
7(1-F)	VMB0283	LEAF SPRING (A)	1	
3(6-C)	VMB0284	LEAF SPRING	1	
3(7-B)	VMB0285	LEAF SPRING	1	
3(3-C, 4-A)	VMB0286	RESET SPRING	2	
6(4-F)	VMB0331	BRAKE SPRING	1	
5(3-F)	VMB106	SPRING	1	
4(7-C, D), (5-B, C)	VMB119	PRESSURE SPRING	6	
5(7-F)	VMB121	UP-DOWN SPRING	1	
7(2-D)	VMB123	LEAF SPRING	1	
6(5-A)	VMB125	BRAKE SPRING (Takeup)	1	
5(7-E)	VMB126	IDLER SPRING	1	
7(2-F)	VMB128	BRAKE SPRING (Supply, Push Button)	5	
4(2-F, 3-D)	VMB134	PRESSURE SPRING	2	
5(3-A), 6(5-E)	VMB14	SPRING	2	
3(7-B, C), 5(3-E)	VMB144	BACK TENSION SPRING	3	
4(6-C, D)	VMB145	ADJUSTING SPRING	2	
5(6-D)	VMB148	SOLENOID SPRING	1	
7(2-F)	VMB151	SPRING	1	

	Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
	4(6-C)	VMB152	BALANCE SPRING (B)	1	
	5(2-B)	VMB172	SPRING (F.F. Select)	1	
	7(2-D)	VMB236	LEAF SPRING	1	
	7(2-E)	VMB41	IDLER SPRING	1	
	5(1-B)	VMB88	SPRING (Slide Lever)	1	
	5(7-E)	VMB94	SPRING	1	
	6(4-E)	VMF0104	FELT	2	
	6(4-F, 6-B)	VMG0138	BRAKE ROLLER	2	
10	7(5-C), 8(3-A)	VMK0098	REINFORCING ANGLE (Front)	1	
	7(5-G)	VMK0099	JACK PANEL BRACKET	1	
	7(1-D)	VML0337	LOCK LEVER	1	
	5(6-E)	VML0353	FAST FORWARD LEVER (A)	1	
	5(7-C)	VML0355	PRESSURE ROLLER ARM	1	
	6(3-A)	VML0356	SWITCH ACTION LEVER	1	
	5(6-F)	VML0358	FAST FORWARD LEVER (B)	1	
	6(4-F)	VML0359	BRAKE RELEASE LEVER (Supply)	1	
	6(4-C)	VML0361	SEE-SAW LEVER (Audio Dub.)	1	
20	5(5-F)	VML0362	INTERMEDIATE LEVER	1	
	6(1-G)	VML116	SWITCH LEVER (A)	1	
	6(1-F)	VML118	SWITCH LEVER (B)	1	
	5(6-F)	VML127	FAN TYPE LEVER	1	
	7(3-D)	VML149	SLIDE LEVER (A)	1	
	7(3-F)	VML150	BRAKE CONTROL LEVER	1	
	7(2-D)	VML261	SLIDE LEVER (B)	1	
	8(1-A, B, C, 2-C)	VMP5047	HINGE	4	
30	6(3-D), (6-C)	VMS0686	REEL SHAFT	2	
	5(7-C)	VMS0728	ROLLER SHAFT	1	
	5(6-C)	VMS0729	PRESSURE ROLLER SHAFT	1	
	7(4-B)	VMS0747	PULLEY SHAFT	1	
	7(1-G)	VMS0752	BUTTON LEVER SHAFT (A)	1	
	7(2-G)	VMS0753	BUTTON LEVER SHAFT (B)	1	
	3(3-C, 4-C, 5-A)	VMS0758	HOLDING SCREW	4	
	4(6-D)	VMS0803	TAPE POST	1	
	6(7-F)	VMS294	TENSION POST	1	
	4(6-C)	VMS388	POST	1	
40	4(3-D)	VMS483	POST, Exit Side	1	
	4(7-D)	VMS654	TAPE ROLLER	1	
	7(5-B)	VMT0014	METER CUSHION	1	
	4(6-D)	VMW0026	TAPE LOOSING ROD	1	
	6(1-F)	VMW0038	INTERLOCKING ROD (Play)	1	
	5(3-C)	VMW0039	INTERCONNECTING ROD (Record)	1	
	5(3-E)	VMW0040	INTERCONNECTING ROD, Still	1	
	6(7-A)	VMW0042	INTERLOCKING ROD	1	
	6(4-F)	VMW0043	INTERLOCKING ROD (Supply Brake)	1	

	Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
	5(6-E)	VMW0045	INTERLOCKING WIRE (A), Fast Forward	1	
	6(4-C)	VMW0048	AUDIO DUB ROD	1	
	5(5-E)	VMW16	INTERLOCKING ROD	1	
	5(6-E)	VMW22	INTERLOCKING WIRE(B), Fast Forward	1	
	5	VMX0035	SPACER	1	
	6(5-F, 6-B)	VMX0048	PRESSURE WASHER	2	
	4(5-D)	VMZ24	FIBER	1	
	6(3-E)	VMZ52	SWITCH FIBER	1	
10	8(5-G)	VPF72	POLYETHYLENE BAG	1	
	8(2-F)	VPG0335	OUTER PACKING CASE	1	
	8	VPG0345	CUSHION (Australian Model Only)	2	
	8	VPG0346	PACKING CASE (Australian Model Only)	1	
	8(4-G)	VPN0271	CUSHION (Right)	1	
	8(5-E)	VPN0272	CUSHION (Left)	1	
	8(6-G)	VPN0273	BATTERY HOLDER	1	
	8(3-F)	VPN0289	INNER PACKING CASE	1	
	8(6-G)	VQF0252	FAN BAG	1	
20	8	VQL242	BATTERY CAUTION LABEL	4	
	4(1-C)	VSA0013	MOTOR SHAFT SLIP RING	1	
	4(6-D)	VSA7	SLIP RING BRUSH	1	
	7(5-B)	VSE0014	BATTERY METER	1	
	6(5-A)	VSF20S	FUSE (2A)	1	
	6(5-B)	VSF50S	FUSE (5A)	1	
	6(2-F)	VSH0007	LEAF SWITCH	1	
	5(6-D)	VSJ0026	SOLENOID	1	
	6(3-E)	VSM5004	MICRO SWITCH	1	
	7(3-G, H, 4-F)	VSM7	MICRO SWITCH	3	
30	5(7-A), 6(2-A)	VSM9	MICRO SWITCH	3	
	6(3-B)	VSP0053	POWER SWITCH	1	
	4(2-B), (6-A)	VSQ1	MAGNET	2	
	4(4-D)	VSQ5001	BAR MAGNET	2	
	7(5-F)	VSS14	SLIDE SWITCH	1	
	6(4-E)	VXA0295	REWIND PULLEY LEVER UNIT	1	
	4(5-C)	VXA0397	A/C HEAD BRACKET UNIT	1	
	6(7-D)	VXA0398	AUTO STOPPER UNIT	1	
	8(2-D)	VXA0399	LEG UNIT	1	
40	6(3-A)	VXA0400	SWITCH BRACKET UNIT	1	
	5(6-A)	VXA0401	CONTROL ANGLE UNIT (1)	1	
	5(7-A)	VXA0402	CONTROL ANGLE UNIT (2)	1	
	4(2-B)	VXA0403	BRUSH HOLDER UNIT	1	
	8(3-E)	VXA0431	CIRCUIT BOARD MOUNTING LEG UNIT	1	
	3(6-C)	VXA0437	COVER LOCK UNIT (Right)	1	
	3(7-B)	VXA0438	COVER LOCK UNIT (Left)	1	
	7(4-B)	VXA0446	PULLEY ANGLE UNIT	1	
	6(3-F), 5(3-E)	VXA0469	BRAKE SPRING HOOK UNIT	1	
	5(3-F)	VXA0470	PAUSE BRAKE UNIT	1	

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
5(2-C)	VXA0480	CAPSTAN UNIT	1	
4(6-D)	VXA0481	ERASE HEAD BRACKET UNIT	1	
6(6-F)	VXA0482	TENSION ARM UNIT	1	
4(5-E)	VXA143	BRUSH BRACKET UNIT	1	
4(2-E)	VXA149	POST BASE UNIT, Exit Side	1	
4(2-F)	VXA150	POST BASE UNIT, Entrance Side	1	
5(4-F)	VXA269	STOPPER ANGLE UNIT	1	
7(3-B)	VXK0169	CONTROL PANEL BRACKET UNIT	1	
6(7-D)	VXL0285	AUTO STOPPER LEVER UNIT	1	
5(3-A)	VXL0286	SWITCH DRIVE LEVER (A) UNIT	1	
5(2-A)	VXL0287	SWITCH DRIVE LEVER (C) UNIT	1	
5(2-A)	VXL0288	SWITCH DRIVE LEVER (D) UNIT	1	
5(2-B)	VXL0289	INTERCONNECTING LEVER UNIT	1	
5(7-D)	VXL0290	SOLENOID ARM UNIT	1	
5(6-A)	VXL0291	ROLLER LEVER UNIT	1	
6(5-F)	VXL0294	REWIND LEVER UNIT	1	
5(7-E)	VXL0296	RB LEVER UNIT	1	
6(6-A)	VXL0310	TAKEUP REEL BRAKE ARM UNIT	1	
6(5-B)	VXL0311	BRAKE RELEASE LEVER UNIT (Takeup)	1	
6(4-F)	VXL0312	SUPPLY REEL BRAKE ARM UNIT	1	
5(7-F)	VXL120	TAKEUP IDLER LEVER UNIT	1	
4(1-C)	VXP0122	PULLEY UNIT	1	
5(4-A)	VXP0124	INTERMEDIATE PULLEY UNIT	1	
5(7-C)	VXP0125	PRESSURE ROLLER UNIT	1	
6(4-E)	VXP0131	REWIND PULLEY UNIT	1	
4(7-A)	VXP0144	CONTROL DISK UNIT	1	
5(7-F)	VXP50	TAKEUP IDLER UNIT	1	
6(6-C)	VXR0046	TAKEUP REEL TABLE UNIT	1	
4(1-B)	VXS0024	MOTOR SHAFT SLIP BRUSH UNIT	1	
4(5-E)	VXS17	SLIP RING ASSEMBLY	1	
7	VXU0046	PUSH BUTTON UNIT	1	
6(6-E)	VXZ7	TENSION BAND UNIT	1	
3(3-C)	VYB0019	CASE UNIT	1	
8(4-G)	VYC0012	SHOULDER BAND UNIT	1	
3(3-C)	VYF0050	CASE COVER UNIT	1	
3(8-E)	VYP0165	PANEL UNIT	1	
4(4-F)	XRP3X5A	RIVET	1	
7	XNG26EFXS	NUT	1	
5, 6, 7, 8	XNG3EFXS	NUT	10	
3, 5, 6	XNG4EFXS	NUT	10	
3	XSB3+10FXKS	SCREW	6	
7	XSC2+4FX	SCREW	2	

Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
3	XSC3+6FXKS	SCREW	4	
6, 7	XSN2+10FXS	SCREW	8	
5	XSN2+16FX	SCREW	2	
4	XSN2+4FXS	SCREW	6	
4	XSN2+5FXS	SCREW	2	
5	XSN26+12FXKS	SCREW	1	
4	XSN26+14FXS	SCREW	2	
6	XSN26+4FXS	SCREW	1	
4	XSN26+6FXS	SCREW	3	
4	XSN3+12FXS	SCREW	1	
8	XSN3+15FXS	SCREW	4	
4, 6, 7	XSN3+4FXS	SCREW	4	
4, 5, 7	XSN3+6FXS	SCREW	24	
4	XSN3+8FXS	SCREW	10	
4, 8	XSN4+8FXS	SCREW	4	
5, 8	XSNQ004S	SCREW	3	
4	XSS26+10FXS	SCREW	6	
7	XSS26+4FX	SCREW	2	
5	XSS3+4FXS	SCREW	3	
7	XSS3+6FXS	SCREW	2	
7	XST3+12FXKS	SCREW	1	
6	XST3+5BCS	SCREW	2	
4	XST3+5FFX	SCREW	1	
7	XST3+6FXKS	SCREW	2	
3	XST3+8BCS	SCREW	4	
3	XST4+12BCS	SCREW	4	
3	XTC3+6BBC	SCREW	4	
3	XTN3+10BFX	SCREW	4	
3	XTN3+4BFX	SCREW	2	
4, 8	XTN3+5FFX	SCREW	7	
7	XTN3+6BFX	SCREW	3	
3, 4, 5, 7, 8	XTN3+6FFX	SCREW	28	
3	XTN3+8BFX	SCREW	10	
6	XYN2+C4FXS	SCREW (w/Washer)	1	
7, 8	XYN3+B8FXS	SCREW (w/Washer)	2	
5	XYN3+C10FXS	SCREW (w/Washer)	1	
7	XYN3+C4FXS	SCREW (w/Washer)	2	
4	XYN3+C5FXS	SCREW (w/Washer)	3	
4, 6, 7, 8	XYN3+C6FXS	SCREW (w/Washer)	14	
3, 4, 5, 7, 8	XYN3+C8FXS	SCREW (w/Washer)	20	
4, 5	XYN3+F5FXS	SCREW (w/Washer)	3	
4, 6, 7	XYN3+F6FXS	SCREW (w/Washer)	6	
4	XYN4+C10FXS	SCREW (w/Washer)	4	
4	XYN4+C6FXS	SCREW (w/Washer)	2	
4	XYN26+C14FXS	SCREW (w/Washer)	2	

	Ref. Page	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
	7	XUC2FP	SNAP RING	1	
	6	XUC25FP	SNAP RING	1	
	4, 5, 6, 7	XUC3FP	SNAP RING	25	
	6, 7	XUC4FP	SNAP RING	5	
	5	XUC5FP	SNAP RING	1	
	4, 5, 6, 7	XWA2AFX	SPRING WASHER	18	
	4, 5, 6, 7	XWA26AFX	SPRING WASHER	6	
	4, 5, 6, 7, 8	XWA3AFX	SPRING WASHER	40	
10	3, 4	XWA4AFX	SPRING WASHER	6	
	5	XWC3BFN	SWARD TOOTH WASHER	2	
	5, 6	XWC4BFN	SWARD TOOTH WASHER	2	
	6	XWG2AFX	FLAT WASHER	1	
	4	XWG26A6FX	FLAT WASHER	1	
	5	XWG26F5FXK	FLAT WASHER	1	
	4	XWG26FX	FLAT WASHER	2	
	4	XWG3D6FC	FLAT WASHER	2	
20	4	XWG3D9FX	FLAT WASHER	4	
	7	XWXV3A	POLYSLIDER WASHER	2	
	6	XWXV3D	POLYSLIDER WASHER	5	
	5, 7	XWXV4D	POLYSLIDER WASHER	8	
	6	XWXV45D	POLYSLIDER WASHER	4	
	5	XWXV4Z	POLYSLIDER WASHER	1	
	6	XWYV3D6	FIBER WASHER	2	
	5	XWYV4A9	FIBER WASHER	3	
30	5, 6	XWYV4D9	FIBER WASHER	16	
	5, 6	XWYV4F9	FIBER WASHER	3	
	5	XWYV6D12	FIBER WASHER	2	
	3, 7	XWZV3D6	MYLAR WASHER	7	
	3	XWZV3F6	MYLAR WASHER	1	
	5, 6	XWZV4A	MYLAR WASHER	2	
	5	XWZV4A9	MYLAR WASHER	1	
	3	XWZV4D9	MYLAR WASHER	4	
	6	XWZV4F	MYLAR WASHER	2	
40					
	4	XXE3D10FXKS	SET SCREW	2	
	4	XXE3D4FXKS	SET SCREW	6	
	5	XXE3D4FXS	SET SCREW	4	
	6	CSTW-4	SNAP WASHER	2	

ELECTRICAL PARTS LIST FOR MODEL NV-3085-E

Unless otherwise specified.
All resistors are in OHMS (Ω), 1/4W, ±5% carbon. K=1,000Ω, M=1,000KΩ,
K=±10%, F=±1%.
All capacitors are in MICROFARADS (μF), P=μμF, ±10%.

SAFETY : Indicates that only parts specified by the manufacturer be used for replacement in critical circuits.

Ref. No.	Part No.	Part Name & Description		Per Set (Pce.)	Unit Price
	VJR003	Clamper		5	
	VJR1L1PSL	Lug Terminal		1	
	VMZ82	Fiber		3	
	VSF20S	Fuse (2A)	SAFETY	1	
	VSF50S	Fuse (5A)	SAFETY	1	
	VSH0007	Leaf Switch		1	
	XTS3+5FFX	Tapping Screw		1	
	XTN3+5FFX	Tapping Screw		12	
	XTN3+6FFX	Tapping Screw		11	
	XYN3+C5FXS	Semus Screw		1	
	XYN3+C6FXS	Semus Screw		7	
	XYN3+C8FXS	Semus Screw		4	
	XYN3+C6FXRS	Semus Screw		6	
	XYN3+F8FXRS	Semus Screw		5	
	XYN4+C10FXS	Semus Screw		4	
	XYN3+C4FXS	Semus Screw		2	
	XWYV3D6	Fiber Washer		2	
	VMZ0131	A.S.C Insulation Sheet		2	
	VSC0114	A.S.C		1	
	VMA1667	H.S.C		1	
	VMZ89	H.S.C Insulation Sheet		2	

POWER SUPPLY CIRCUIT BOARD ASSY

TRANSISTORS

TR101	2SC828	Si NPN EP	1
TR102	2SA564	Si NPN EP	1
TR103	2SC1317	Si PNP EP	1
TR104	2SC828	Si NPN EP	1
TR105	2SC1226-P	Si NPN EP	1
TR106	2SC828	Si NPN EP	1

DIODES

D101, 102 ...	OA90	Ge Point Contact	2
D103	OA95	Ge Point Contact	1
D104	10D1	Ge Gold Bond	1
D105	WZ061	Zener	1
D106	1S953	Si Variable Capacitance	1

THERMISTOR

TH101	ERTD2FHL102S		1

RESISTORS

R101	EVNK4AA00B14	Variable	10K	1
R102	ERD14VJ105		1M	1
R103	ERD14VJ183		18K	1
R104	ERD14VJ332		3.3K	1
R105	ERD14VJ152		1.5K	1
R106	ERD14VJ123		12K	1
R107	ERD14TJ102		1K	1
R108	ERD14VJ153		15K	1
R109	ERD14VJ103		10K	1
R110~112 ...	ERD14VJ562		5.6K	3
R113	ERD14VJ123		12K	1
R114	EVNK4AA00B14	Variable	10K	1
R115	ERD14VJ102		1K	1

Ref. No.	Part No.	Part Name & Description		Per Set (Pce.)	Unit Price
R116	ERD14VJ561		560	1	
R117	ERD14VJ332		3.3 K	1	
R118	EVNK4AA00B13	Variable	1 K	1	
R119	ERD14VJ122		1.2 K	1	
R120	ERD14VJ102		1 K	1	
R121	ERD14VJ222		2.2 K	1	
R122	ERD14TJ272		2.7 K	1	
CAPACITORS					
C101	ECEA16V10L	Electrolytic	16 V	10	1
C102	ECEA16V47L	Electrolytic	16 V	47	1
C103	ECEA16V10L	Electrolytic	16 V	10	1
C104	ECEA16V100L	Electrolytic	16 V	100	1
C105	ECEA10V47L	Electrolytic	10 V	47	1
C106	ECKC1H103PF	Ceramic	10^4 V	0.01	1
C107	ECEA6V220L	Electrolytic	6 V	220	1
RELAY					
K101	VSY402A				1
MISCELLANEOUS					
	VJH28	Check Terminal			2
	VJS52	9 P Socket			1
	VMA1645	Reinforcement Plate			1
	VMP5049	Insulation Tube			1
	VQL328B	Label			1
	VSQ5008	Insulation Tube			1
	XNG3EFXS	Nut			3
	XYN3+F8FXS	Semus Screw			1
	XYN3+F10FXS	Semus Screw			2

CONTROL CIRCUIT BOARD ASSY

Ref. No.	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
TRANSISTORS				
TR201~204 ...	2SC828	Si NPN EP	4	
TR205	2SK37	FET	1	
TR206, 207 ...	2SC828	Si NPN EP	2	
TR208	2SA564	Si PNP EP	1	
TR209~213 ...	2SC828	Si NPN EP	5	
TR214, 215 ...	2SC828-P	Si NPN EP	2	
TR216	2SC1226-P	Si NPN EP	1	
TR217~219 ...	2SC828	Si NPN EP	3	
TR220	2SA564	Si PNP EP	1	
TR221~228 ...	2SC828	Si NPN EP	8	
TR229	2SC828-P	Si NPN EP	1	
TR230	2SC1226-P	Si NPN EP	1	
TR231~242, 601	2SC828	Si NPN EP	13	
TR602	2SC1226-P	Si NPN EP	1	
DIODES				
D201~205 ...	1S953	Si Variable Capacitance	5	
D206, 207 ...	OA90	Ge Point Contact	2	
D208	VD1222	Varistor	1	
D209	OA90	Ge Point Contact	1	
D210, 211 ...	1S953	Si Variable Capacitance	2	
D212	WZ094	Zener	1	
D213	OA90	Ge Point Contact	1	
D214	VD1222	Varistor	1	
D215~217 ...	OA90	Ge Point Contact	3	
D218	1S953	Si Variable Capacitance	1	
D219~221 ...	OA90	Ge Point Contact	3	
D222	WZ061	Zener	1	
D601	RD4A	Si Zener	1	
D602	10D1	Si Alloy Diffused	1	
ICS				
IC201	AN301	VTR Servo Control Signal Process Circuit	1	
IC202, 203 ...	DN1946	Quadruple 2-Input NAND Gate	2	
IC204	MN116	Frequency Divider	1	
THERMISTOR				
TH601	ERTD2FHL332S		1	
RESISTORS				
R202	EVNK4AA00B15	Semi-fixed 100 K	1	
R203	ERD14VJ124	120 K	1	

Ref. No.	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
R204	ERD14VJ102		1 K 1	
R205	ERD14VJ564		560 K 1	
R206	ERD14VJ104		100 K 1	
R207～209 ...	ERD14VJ103		10 K 3	
R210	ERD14VJ334		330 K 1	
R211	ERD14VJ563		56 K 1	
R212	ERD14VJ103		10 K 1	
R213	ERD14VJ473		47 K 1	
R214	ERD14VJ223		22 K 1	
R215	ERD14VJ332		3.3 K 1	
R216, 217 ...	ERD14VJ333		33 K 2	
R218	ERD14VJ473		47 K 1	
R219	ERD14VJ333		33 K 1	
R220	ERD14VJ152		1.5 K 1	
R221, 222 ...	ERD14VJ101		100 2	
R224	ERD14VJ472		4.7 K 1	
R225	ERD14VJ473		47 K 1	
R226	ERD14VJ104		100 K 1	
R227	ERD14VJ393		39 K 1	
R228	ERD14VJ223		22 K 1	
R229	ERD14VJ472		4.7 K 1	
R230	EVNK4AA00B54	Semi-fixed	50 K 1	
R231	ERD14VJ153		15 K 1	
R232	ERD14VJ223		22 K 1	
R233	ERD14VJ472		4.7 K 1	
R234, 235 ...	ERD14VJ223		22 K 2	
R236	ERD14VJ332		3.3 K 1	
R237	ERD14VJ563		56 K 1	
R238	ERD14VJ562		5.6 K 1	
R239	ERD14VJ103		10 K 1	
R240, 241 ...	ERD14VJ333		33 K 2	
R242	ERD14VJ103		10 K 1	
R243	ERD14VJ563		56 K 1	
R244	ERD14VJ562		5.6 K 1	
R245	EVNK4AA00B23	Semi-fixed	2 K 1	
R248	ERD14VJ152		1.5 K 1	
R249	ERD14VJ222		2.2 K 1	
R250	ERD14VJ154		150 K 1	
R251	ERD14VJ223		22 K 1	
R252	EVNK4AA00B54	Semi-fixed	50 K 1	
R253	ERD14VJ393		39 K 1	
R254	ERD14VJ223		22 K 1	
R255	ERD14VJ332		3.3 K 1	
R256	ERD14VJ391		390 1	
R257	ERD14VJ103		10 K 1	
R258	ERD14VJ472		4.7 K 1	
R259	ERD14VJ681		680 1	
R260	ERD14VJ151		150 1	
R261	ERD14VJ102		1 K 1	
R262	ERD14VJ472		4.7 K 1	
R263	ERD14VJ221		220 1	
R264	ERD14VJ223		22 K 1	
R265	ERD14VJ332		3.3 K 1	
R266	ERD14VJ563		56 K 1	
R267	EVNK4AA00B15	Semi-fixed	100 K 1	
R268, 269 ...	ERD14VJ223		22 K 2	
R270	ERD14VJ473		47 K 1	
R271, 272 ...	ERD14VJ332		3.3 K 1	
R274	ERD14VJ223		22 K 1	
R275	ERD14VJ103		10 K 1	
R276	ERD14VJ223		22 K 1	
R277	ERD14VJ393		39 K 1	
R278	ERD14VJ103		10 K 1	
R279	ERD14VJ472		4.7 K 1	
R280	ERD14VJ102		1 K 1	
R281	ERD14VJ222		2.2 K 1	
R282, 283 ...	ERD14VJ103		10 K 2	
R284, 285 ...	ERD14VJ333		33 K 2	
R286	ERD14VJ103		10 K 1	
R287	ERD14VJ152		1.5 K 1	
R288	ERD14VJ222		2.2 K 1	
R289	ERD14VJ104		100 K 1	
R290	ERD14VJ123		12 K 1	
R291	EVNK4AA00B54	Semi-fixed	50 K 1	

Ref. No.	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
R292	ERD14VJ473		47 K 1	
R293	ERD14VJ223		22 K 1	
R294	ERD14VJ683		68 K 1	
R295	ERD14VJ223		22 K 1	
R296	ERD14VJ471		470 1	
R297	ERD14VJ332		3.3 K 1	
R298	ERD14VJ103		10 K 1	
R299	ERD14VJ472		4.7 K 1	
R601	ERD14VJ561		560 1	
R602	EVNK4AA00B24	Semi-fixed	20 K 1	
R603	ERD14VJ822		8.2 K 1	
R604	ERD14VJ221		220 1	
R605	ERD14VJ102		1 K 1	
R606	ERD14VJ682		6.8 K 1	
R2101	ERD14VJ681		680 1	
R2102	ERD14VJ471		470 1	
R2103	ERD14VJ330		33 1	
R2104	ERD14VJ182		1.8 K 1	
R2105	ERD14VJ563		56 K 1	
R2106	ERD14VJ103		10 K 1	
R2107	ERD14VJ561		560 1	
R2108	ERD14VJ471		470 1	
R2109	ERD14VJ562		5.6 K 1	
R2110	ERD14VJ103		10 K 1	
R2111	ERD14VJ472		4.7 K 1	
R2112	ERD14VJ562		5.6 K 1	
R2113	ERD14VJ103		10 K 1	
R2114	ERD14VJ472		4.7 K 1	
R2115	ERD14VJ683		68 K 1	
R2116, 2117 ...	ERD14VJ223		22 K 2	
R2118	ERD14VJ472		4.7 K 1	
R2119	ERD14VJ332		3.3 K 1	
R2120	ERD14VJ182		1.8 K 1	
R2121	ERD14VJ563		56 K 1	
R2122	ERD14VJ103		10 K 1	
R2123	ERD14VJ564		560 K 1	
R2124	ERD14VJ561		560 1	
R2125	ERD14VJ471		470 1	
R2126	ERD14VJ103		10 K 1	
R2127	ERD14VJ472		4.7 K 1	
R2128	EVNK4AA00B24	Semi-fixed	20 K 1	
R2129	ERD14VJ563		56 K 1	
R2130, 2131 ...	ERD14VJ223		22 K 2	
R2132	ERD14VJ472		4.7 K 1	
R2133, 2134 ...	ERD14VJ103		10 K 2	
R2135	ERD14VJ471		470 1	
R2136	ERD14VJ153		15 K 1	
R2137	ERD14VJ472		4.7 K 1	
R2138	EVNK4AA00B24	Semi-fixed	20 K 1	
R2139～2141 ...	ERD14VJ223		22 K 3	
R2142	ERD14VJ472		4.7 K 1	
R2143	ERD14VJ474		470 K 1	
R2144	ERD14VJ153		15 K 1	
R2145	ERD14VJ103		10 K 1	
R2146	ERD14VJ471		470 1	
R2147	ERD14VJ182		1.8 K 1	
R2150	ERD14VJ331		330 1	
CAPACITORS				
C201	ECEA16N10	Nonpolarity Electrolytic 16 V	10 1	
C202	ECEA16V10L	Electrolytic 16 V	10 1	
C203	ECKD2H561KB	Ceramic	560 P 1	
C204	ECEA16V47L	Electrolytic 16 V	47 1	
C205	ECKD2H391KA	Ceramic	390 P 1	
C206	ECEA16N10	Nonpolarity Electrolytic 16 V	10 1	
C207	ECAF16ER1	Aluminum Solid 16 V	0.1 1	
C208	ECAF16ER15	Aluminum Solid 16 V	0.15 1	
C209	ECEA16V10L	Electrolytic 16 V	10 1	
C210	ECQM05472KZ	Mylar 50 V	0.0047 1	
C211	ECKD2H331KA	Ceramic	330 P 1	
C212	ECQM05104KZ	Mylar 50 V	0.1 1	
C213	ECQM05683KZ	Mylar 50 V	0.068 1	
C214	ECAF16ER33	Aluminum Solid 16 V	0.33 1	
C215	ECQM05102KZ	Mylar 50 V	0.001 1	

Ref. No.	Part No.	Part Name & Description			Per Set (Pce.)	Unit Price
C216~218 ...	ECQM05103KZ	Mylar	50 V	0.01	3	
C219, 220 ...	ECEA16V10L	Electrolytic	16 V	10	2	
C221	ECQM05102KZ	Mylar	50 V	0.001	1	
C222	ECEA16V10L	Electrolytic	16 V	10	1	
C223	ECQM05224KZ	Mylar	50 V	0.22	1	
C224	ECEA16V47L	Electrolytic	16 V	47	1	
C225	ECQM05393KZ	Mylar	50 V	0.039	1	
C226	ECEA25V4R7L	Electrolytic	25 V	4.7	1	
C227	ECQM05103KZ	Mylar	50 V	0.01	1	
C228	ECQM05104KZ	Mylar	50 V	0.1	1	
C229	ECQM05103KZ	Mylar	50 V	0.01	1	
C230	ECEA16V10L	Electrolytic	16 V	10	1	
C231	ECEA16V47L	Electrolytic	16 V	47	1	
C232, 233 ...	ECKD2H391KA	Ceramic		390 P	2	
C234	ECKD2H561KB	Ceramic		560 P	1	
C235	ECEA16V10L	Electrolytic	16 V	10	1	
C236	ECEA6V100L	Electrolytic	6 V	100	1	
C237	ECKD2H101KA	Ceramic		100 P	1	
C238	ECQM05153KZ	Mylar	50 V	0.015	1	
C239	ECEA16V10L	Electrolytic	16 V	10	1	
C240	ECEA16V47L	Electrolytic	16 V	47	1	
C241	ECEA16V100L	Electrolytic	16 V	100	1	
C242	ECEA50V1L	Electrolytic	50 V	1	1	
C243	ECEA16V100L	Electrolytic	16 V	100	1	
C244	ECEA16V47L	Electrolytic	16 V	47	1	
C245	ECQM05333KZ	Mylar	50 V	0.033	1	
C246	ECAF16ER33	Aluminum Solid	16 V	0.33	1	
C247	ECEA50V1L	Electrolytic	50 V	1	1	
C248	ECEA16V47L	Electrolytic	16 V	47	1	
C249	ECQM05153KZ	Mylar	50 V	0.015	1	
C250	ECQM05683KZ	Mylar	50 V	0.068	1	
C251	ECAF16ER33	Aluminum Solid	16 V	0.33	1	
C252, 253 ...	ECKD2H391KA	Ceramic		390 P	2	
C254	ECEA16V47L	Electrolytic	16 V	47	1	
C255	ECKD2H561KB	Ceramic		560 P	1	
C256	ECKD101KA	Ceramic		100 P	1	
C257	ECQM05153KZ	Mylar	50 V	0.015	1	
C258	ECEA6V47L	Electrolytic	6 V	47	1	
C259	ECEA16V10L	Electrolytic	16 V	10	1	
C260	ECEA50V1L	Electrolytic	50 V	1	1	
C261, 262 ...	ECEA16V220LU	Electrolytic	16 V	220	2	
C263	ECEA16V47L	Electrolytic	16 V	47	1	
C264, 265 ...	ECQS1102KZ	Styrol	125 V	0.001	2	
C266	ECQM05122KZ	Mylar	50 V	0.0012	1	
C267	ECKD2H331KA	Ceramic		330 P	1	
C268	ECQS1681KZ	Styrol	125 V	680 P	1	
C269	ECQM05273KZ	Mylar	50 V	0.027	1	
C270	ECEA16V10L	Electrolytic	16 V	10	1	
C271, 272 ...	ECQS1472KZ	Styrol	125 V	0.0047	2	
C273	ECKD2H101KA	Ceramic		100 P	1	
C274	ECQS1471KZ	Styrol	125 V	470 P	1	
C275	ECKD2H101KA	Ceramic		100 P	1	
C276	ECEA16V10L	Electrolytic	16 V	10	1	
C277	ECQM05102KZ	Mylar	50 V	0.001	1	
C278, 280 ...	ECQM05103KZ	Mylar	50 V	0.01	2	
C281, 282 ...	ECEA16V10L	Electrolytic	16 V	10	2	
C283	ECQM05223KZ	Mylar	50 V	0.022	1	
C284	ECQM05473MZ	Mylar	50 V	0.047	1	
C285	ECCD1H101K	Ceramic	10^4 V	100 P	1	
C286	ECAF16ER1	Aluminum Solid	16 V	0.1	1	
C601	ECEA16N10	Nonpolarity Electrolytic	16 V	10	1	
INDUCTANCES, COILS						
L201	VLQ7H101K	Inductance		100μH	1	
L202, 203 ...	VTQ0004	Choke Coil			2	
L204	VLQ7H101K	Inductance		100μH	1	
L205, 206 ...	VLT22	Oscillation Coil			2	
SWITCH						
S201	VSS12				1	
MISCELLANEOUS						
	VHP5049	Insulation Tube			3	
	VJH28	Check Terminal			36	
	VJP0070	15 P Connector			1	

Ref. No.	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
	VLQ322C13	Assembly No Label	1	
	VMA1644	Heat Sink	1	
	VSQ5008	Insulation Plate	3	
	XYN3+C10FXS	Semus Screw	2	
	XYN3+F6FXS	Semus Screw	3	
	XWG3DFX	Flat Washer	2	

VIDEO/AUDIO CIRCUIT BOARD ASSY

TRANSISTORS

TR301	2SC828	Si NPN EP	1
TR302	2SC1317	Si NPN EP	1
TR303, 304 ...	2SC269-L	Si NPN	2
TR305～307 ...	2SC828	Si NPN EP	3
TR308, 309 ...	2SC1359-B	Si NPN EP	2
TR310	2SC1317	Si NPN EP	1
TR311	2SC828	Si NPN EP	1
TR401	2SC644F	Si NPN EP	1
TR402～405 ...	2SC828	Si NPN EP	4
TR406, 407 ...	2SC1383-Q	Si NPN EP	2
TR501	2SC1383	Si NPN EP	1
TR502	2SC1047	Si NPN EP	1
TR503	2SC828	Si NPN EP	1
TR504	2SC1359-B	Si NPN EP	1
TR505	2SC828	Si NPN EP	1
TR506	2SC1047	Si NPN EP	1
TR507	2SC828	Si NPN EP	1
TR508	2SC1359-B	Si NPN EP	1

ICS

IC301	AN302	VTR Video AGC Circuit	1
IC302	AN304	VTR Video FM Limiter	1
IC401	BA301		1

BLOCK FILTERS

FL301, 302 ...	VLF0013		2

DIODES

D301, 302 ...	1S953	Si Variable Capacitance	2
D303, 304 ...	1SS16		2
D305, 401, 402...	1S953	Si Variable Capacitance	3

RESISTORS

R301	ERD14VJ122			1.2 K	1
R302, 303 ...	ERD14VJ103			10 K	2
R304	ERD14VJ222			2.2 K	1
R305	ERD14VJ182			1.8 K	1
R306	ERD14VJ221			220	1
R307	ERD14VJ182			1.8 K	1
R308	ERD14VJ332			3.3 K	1
R309	ERD14VJ473			47 K	1
R310	ERD14VJ273			27 K	1
R311	ERD14VJ105			1 M	1
R312	EVNK4AA00B23	Semi-fixed		2 K	1
R313	ERD14VJ105			1 M	1
R314	ERD14VJ331			330	1
R315	EVNK4AA00B53	Semi-fixed		5 K	1
R316	ERD14VJ272			2.7 K	1
R317	EVNK4AA00B13	Semi-fixed		1 K	1
R318	ERD14VJ391			390	1
R319	ERD14VJ272			2.7 K	1
R320	ERD14VJ472			4.7 K	1
R321	ERD14VJ394			390 K	1
R322	ERD14VJ101			100	1
R323	ERD14VJ222			2.2 K	1
R324	ERD14VJ153			15 K	1
R325	ERD12TJ221		1/2 W	220	1
R326	ERD14VJ682			6.8 K	1
R327	ERX14TXF3300	Metal	±1%	330	1
R328	ERD14VJ562			5.6 K	1
R329	ERX14TXF2201	Metal	±1%	2.2 K	1
R330	EVNK4AA00B13	Semi-fixed		1 K	1
R331	ERD14VJ562			5.6 K	1
R332	ERX14TXF2201	Metal	±1%	2.2 K	1
R333	ERX14TXF3300	Metal	±1%	330	1
R334	ERD14VJ151			150	1

Ref. No.	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
R335	ERD14VJ121		120 1	
R336	ERD14VJ222		2.2 K 1	
R337	ERD14VJ331		330 1	
R338	ERD14VJ153		15 K 1	
R339	ERD14VJ392		3.9 K 1	
R340	ERD14VJ102		1 K 1	
R341	ERD14VJ471		470 1	
R342	ERD14VJ393		39 K 1	
R343	EVNK4AA00B24	Semi-fixed	20 K 1	
R344	ERD14VJ473		47 K 1	
R345	ERD14VJ101		100 1	
R346	ERD14VJ102		1 K 1	
R347	ERD14VJ222		2.2 K 1	
R348	ERD14VJ562		5.6 K 1	
R349	ERD14VJ181		180 1	
R350	ERD14VJ103		10 K 1	
R351	EVN22AA00B12	Semi-fixed	100 1	
R352	ERD14VJ151		150 1	
R353	ERD14VJ102		1 K 1	
R354	ERD14VJ333		33 K 1	
R355	ERD14VJ562		5.6 K 1	
R356	ERD14VJ182		1.8 K 1	
R357	ERD14VJ271		270 1	
R358	EVNK4AA00B23	Semi-fixed	2 K 1	
R359, 360 ...	ERD14VJ822		8.2 K 2	
R361	ERD14VJ222		2.2 K 1	
R362	ERD14VJ183		18 K 1	
R363	ERD14VJ332		3.3 K 1	
R364	ERD14VJ152		1.5 K 1	
R365	ERD14VJ151		150 1	
R366	ERD14VJ152		1.5 K 1	
R367	EVNK4AA00B53	Semi-fixed	5 K 1	
R368	ERD14VJ222		2.2 K 1	
R369	ERD14VJ821		820 1	
R370	ERD14VJ103		1 K 1	
R371	ERD14VJ152		1.5 K 1	
R372	ERD14VJ102		1 K 1	

Ref. No.	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
R373	ERD14VJ101		100 1	
R374	ERD14VJ222		2.2 K 1	
R375	ERD14VJ153		15 K 1	
R376	ERD14VJ220		22 1	
R377	ERD14VJ471		470 1	
R378	ERD14VJ220		22 1	
R380	ERD14VJ270		27 1	
R381	ERD14VJ331		330 1	
R382	ERD14TJ102		1 K 1	
R404	ERD14VJ224		220 K 1	
R405	ERD14VJ823		82 K 1	
R406	ERD14VJ682		6.8 K 1	
R407	ERD14VJ222		2.2 K 1	
R408	ERD14VJ331		330 1	
R409	ERD14VJ183		18 K 1	
R410	EVNK4AA00B24	Semi-fixed	20 K 1	
R411	ERD14VJ392		3.9 K 1	
R412	ERD14VJ822		8.2 K 1	
R413	ERD14VJ562		5.6 K 1	
R414	ERD14VJ222		2.2 K 1	
R415	ERD14VJ184		180 K 1	
R416	ERD14VJ154		150 K 1	
R417	ERD14VJ333		33 K 1	
R418	ERD14VJ104		100 K 1	
R419	ERD14VJ182		1.8 K 1	
R420	ERD14VJ224		220 K 1	
R421	ERD14VJ223		22 K 1	
R422	ERD14VJ102		1 K 1	
R423	ERD14VJ183		18 K 1	
R424	ERD14VJ152		1.5 K 1	
R425	ERD14VJ102		1 K 1	
R426	ERD14VJ223		22 K 1	
R427	ERD14VJ123		12 K 1	
R428	ERD14VJ273		27 K 1	
R429	ERD14VJ563		56 K 1	
R430	ERD14VJ121		120 1	
R431	ERD14VJ471		470 1	
R432	ERD14VJ3R9		3.9 1	

Ref. No.	Part No.	Part Name & Description		Per Set (Pce.)	Unit Price
R433, 434 ...	ERD14VJ472			4.7 K 2	
R501	ERD14VJ470			47 1	
R502	EVN22AA00B12	Semi-fixed		100 1	
R503	ERD14VJ472			4.7 K 1	
R504	ERD14VJ272			2.7 K 1	
R505	ERD12TJ390		1/2 W	39 1	
R506	ERD12TJ330		1/2 W	33 1	
R507	ERD14VJ100			10 1	
R508～510 ...	ERD14VJ101			100 3	
R511	ERD14VJ100			10 1	
R512	ERD14VJ101			100 1	
R513	ERD14VJ104			100 K 1	
R514	ERD14VJ183			18 K 1	
R515	ERD14VJ271			270 1	
R516	ERD14VJ102			1 K 1	
R517	ERD14VJ123			12 K 1	
R518	ERD14VJ823			82 K 1	
R519	ERD14VJ183			18 K 1	
R520	ERD14VJ332			3.3 K 1	
R521	ERD14VJ330			33 1	
R522	ERD14VJ102			1 K 1	
R523	ERD14VJ223			22 K 1	
R524	ERD14VJ152			1.5 K 1	
R525	EVNK4AA00B23	Semi-fixed		2 K 1	
R526	ERD14VJ563			56 K 1	
R527	ERD14VJ153			15 K 1	
R528	ERD14VJ330			33 1	
R529	ERD14VJ104			100 K 1	
R530	ERD14VJ183			18 K 1	
R531	ERD14VJ271			270 1	
R532	ERD14VJ102			1 K 1	
R533	ERD14VJ123			12 K 1	
R534	ERD14VJ823			82 K 1	
R535	ERD14VJ183			18 K 1	
R536	ERD14VJ223			22 K 1	
R537	ERD14VJ332			3.3 K 1	
R538	ERD14VJ330			33 1	
R539	ERD14VJ102			1 K 1	
R540	ERD14VJ152			1.5 K 1	

CAPACITORS

C301	ECEA10V47L	Electrolytic	10 V	47	1	
C302	ECEA6V47L	Electrolytic	6 V	47	1	
C303	ECEA16V10L	Electrolytic	16 V	10	1	
C304, 305 ...	ECEA10V47L	Electrolytic	10 V	47	1	
C306	ECKD1H103PF	Ceramic	10^4 V	0.01	1	
C307	ECEA10V47L	Electrolytic	10 V	47	1	
C308	ECAF16ER15	Aluminum Solid	16 V	0.15	1	
C309	ECEA10V47L	Electrolytic	10 V	47	1	
C310	ECEA16N47	Nonpolarity Electrolytic	16 V	47	1	
C311	ECQS1331KZ	Styrol	125 V	330 P	1	
C312	ECEA16N4R7	Nonpolarity Electrolytic	16 V	4.7	1	
C313, 314 ...	ECEA10V47L	Electrolytic	10 V	47	1	
C315	ECEA6V330L	Electrolytic	6 V	330	1	
C316	VCCD1H400JC	Ceramic	10^4 V	40 P	1	
C317	VCCD1H200JC	Ceramic	10^4 V	20 P	1	
C318	ECV1ZW20X44	Trimmer	1 W	1～20 P	1	
C319	ECKD1H103PF	Ceramic	10^4 V	0.01	1	
C320	ECEA50V1L	Electrolytic	50 V	1	1	
C321～324 ...	ECKD1H103PF	Ceramic	10^4 V	0.01	1	
C325	ECKD1H103PF3	Ceramic	10^4 V	0.01	1	
C326	ECKD1H103PF	Ceramic	10^4 V	0.01	1	
C327	ECEA6V47L	Electrolytic	6 V	47	1	
C328	ECKD1H103PF	Ceramic	10^4 V	0.01	1	
C329	ECEA10V47L	Electrolytic	10 V	47	1	
C330	ECKD1H103PF	Ceramic	10^4 V	0.01	1	
C331, 332 ...	ECEA10V47L	Electrolytic	10 V	47	2	
C333	ECQS1681KZ	Styrol	125 V	680 P	1	
C334	ECEA6V330L	Electrolytic	6 V	330	1	
C335	ECEA6V220L	Electrolytic	6 V	220	1	
C337, 338 ...	ECEA10V47L	Electrolytic	10 V	47	2	
C339	ECEA6V220L	Electrolytic	6 V	220	1	
C340	ECKD2H181KA	Ceramic		180 P	1	

Ref. No.	Part No.	Part Name & Description			Per Set (Pce.)	Unit Price
C341	ECQM05102MZ	Mylar	50 V	0.001	1	
C342	ECEA10V47L	Electrolytic	10 V	47	1	
C343	ECEA6V220L	Electrolytic	6 V	220	1	
C344	ECEA10V47L	Electrolytic	10 V	47	1	
C345	ECEA50V1L	Electrolytic	50 V	1	1	
C347, 348 ...	ECEA10V100L	Electrolytic	10 V	100	2	
C349, 350 ...	ECEA6V330L	Electrolytic	6 V	330	2	
C351	ECEA10V47L	Electrolytic	10 V	47	1	
C352	ECKD2H121KA	Ceramic		120 P	1	
C353	VCCD1H100JC	Ceramic	10^4 V	10 P	1	
C355	ECQM05123KZ	Mylar	50 V	0.012	1	
C401	ECEA16V10L	Electrolytic	16 V	10	1	
C402	ECEA10V47L	Electrolytic	10 V	47	1	
C403	VCCD1H680JC	Ceramic	10^4 V	68 P	1	
C404	ECEA16V10L	Electrolytic	16 V	10	1	
C405	ECEA10V47L	Electrolytic	10 V	47	1	
C406	ECEA10V100L	Electrolytic	10 V	100	1	
C407	ECEA50V1L	Electrolytic	50 V	1	1	
C408	VCCD1H400JC	Ceramic	10^4 V	40 P	1	
C409	ECEA16V10L	Electrolytic	16 V	10	1	
C410	ECKD2H101KA	Ceramic		100 P	1	
C411	ECEA16V47L	Electrolytic	16 V	47	1	
C412, 413 ...	ECEA16V10L	Electrolytic	16 V	10	2	
C414	ECQM05333KZ	Mylar	50 V	0.033	1	
C415	ECQM05102MZ	Mylar	50 V	0.001	1	
C416	ECEA50V1L	Electrolytic	50 V	1	1	
C417, 418 ...	ECEA16V10L	Electrolytic	16 V	10	2	
C419	ECQS1681KZ	Styrol	125 V	680 P	1	
C420	ECEA16V47L	Electrolytic	16 V	47	1	
C421	ECEA16V10L	Electrolytic	16 V	10	1	
C422	ECEA6V220L	Electrolytic	6 V	220	1	
C423	ECEA25V4R7L	Electrolytic	25 V	4.7	1	
C424, 425 ...	ECQM05103KZ	Mylar	50 V	0.01	2	
C426	ECEA10V47L	Electrolytic	10 V	47	1	
C427, 428 ...	ECQM05333KZ	Mylar	50 V	0.033	2	
C429	ECCD2H680JC	Ceramic		68 P	1	
C430	ECQS5152J	Styrol		0.0015	1	

Ref. No.	Part No.	Part Name & Description			Per Set (Pce.)	Unit Price
C431	ECV1ZW50X44	Trimmer	1 W	1~50 P	1	
C432	ECQM05102MZ	Mylar	50 V	0.001	1	
C501	ECEA10V47L	Electrolytic	10 V	47	1	
C502, 503 ...	ECKD1H103PF	Ceramic	10^4 V	0.01	2	
C504	ECEA16V10L	Electrolytic	16 V	10	1	
C505	ECKD1H103PF	Ceramic	10^4 V	0.01	1	
C506	ECQS1681KZ	Styrol	125 V	680 P	1	
C507, 508 ...	ECEA50V1L	Elecrolytict	50 V	1	2	
C509	ECKD1H103PF	Ceramic	10^4 V	0.01	1	
C510	ECV1ZW20X44	Trimmer	1 W	1~20 P	1	
C511~516 ...	ECKD1H103PF	Ceramic	10^4 V	0.01	6	
C517	ECV1ZW20X44	Trimmer	1 W	1~20 P	1	
C518~522 ...	ECKD1H103PF	Ceramic	10^4 V	0.01	5	
C523	ECEA50V1L	Electrolytic	50 V	1	1	
C524	ECQS1681KZ	Styrol	125 V	680 P	1	
INDUCTANCES, COILS						
L301~305 ...	VLQ70L221K			220μH	5	
L306	VLQ70L101K			100μH	1	
L401	VLT12	Choke			1	
L402	VLQ7H102J			1 mH	1	
L403	VLQ12S181K			180μH	1	
L501	VLQ70L221K			220μH	1	
L502	VLQ70L221K			220μH	1	
L503	VLQ7H102J			1 mH	1	
L504	ELQ2P1	Choke			1	
L505	VLQ5H150K			15μH	1	
L506, 507 ...	ELQ2P1	Choke			2	
L508	VLQ5H150K			15μH	1	
L509	ELQ2P1	Choke			1	
L510	VLT12	Choke			1	
TRANSFORMERS						
T301	ELT10S906	High-Frequency			1	
T302	ELT10S905	High-Frequency			1	
T401	VTD1				1	
T402	VLT0024	Oscillation			1	
T501, 502 ...	ELT10S932	High-Frequency			2	

Ref. No.	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
	SWITCHES			
S301	VSS12		1	
S401	VSS8		1	
	MISCELLANEOUS			
	VJH28	Check Terminal	10	
	VMA1665	Shield Case	1	
	VMZ88	Fiber A	1	
	VQL322D11	Label	1	
	VSC0118	Head Amp. Shield Case	1	
	VSC0141	Shield Case	1	
	VSC0142	Shield Case	1	
	VSC0143	Shield Case	1	

SWITCH CIRCUIT BOARD ASSY

	RESISTORS			
R379	ERD14VJ471S		470	1
R401	ERD14VJ334S		330 K	1
R402	ERD14VJ561S		560	1
	SWITCH			
	VSS14	Select		1

JACK BOARD ASSY

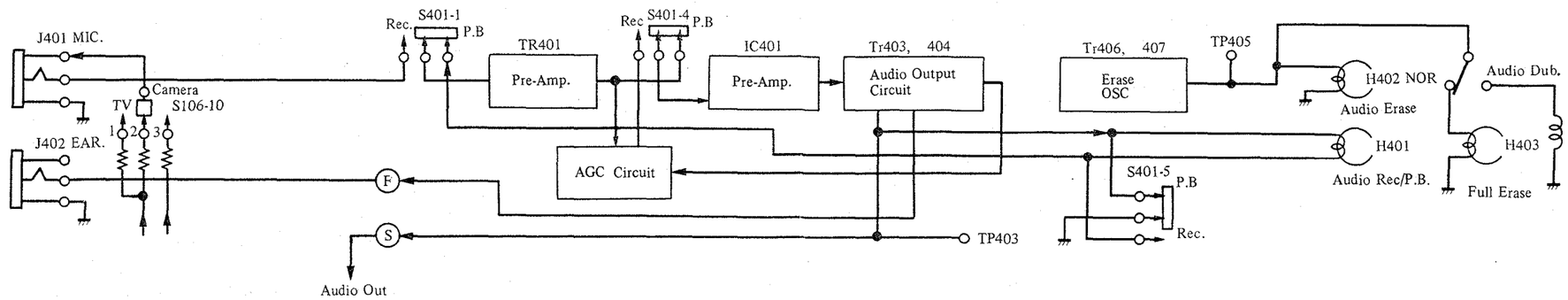
	EVJA0BT12B55	Tracking Control	50 K	1
	RBT16B	Tracking Control Knob		1

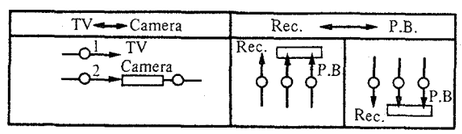
Ref. No.	Part No.	Part Name & Description	Per Set (Pce.)	Unit Price
	QJT0015	Lug Terminal Board	2	
	VGK0321	Decoration Plate, Jack	1	
	VMK0099	Base Plate, Jack	1	
	VJH8	Oval Lug Terminal	1	
	VJS0090	4 P Connector	1	
	VJS25	10 P Connector	1	
	VJS1003	Coaxial Lug Terminal	1	
	XNG3EFXS	M3 Nut	1	
	XSS26+4FX	Screw	2	
	XST3+6FXKS	Screw	2	
	XST3+12FXKS	Screw	1	
	XWA3AFX	Spring Washer	1	
	XWZV3D6	Polyslider Washer	3	

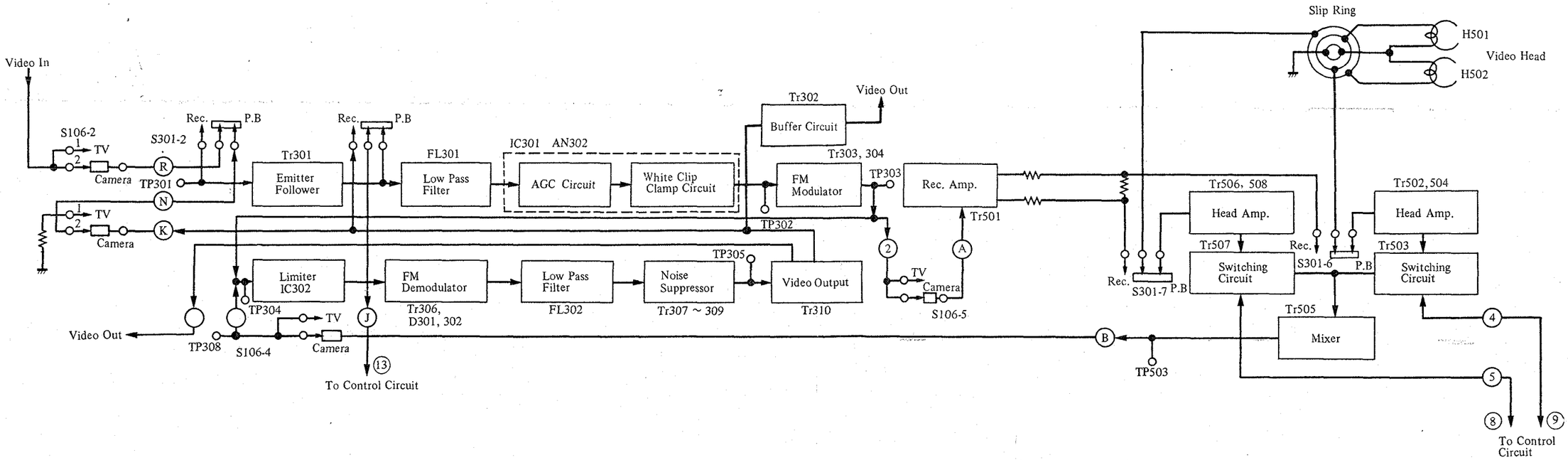
WIRING ASSY

	VMA0641	Angle, Circuit Board Connector	1
	VMP5047	Hinge	4
	VJP50	9 P Plug	1
	VJS0092	Circuit Board Connector	1
	VJS0091	Circuit Board Connector	1
	VJS51	6 P Connector	1
	XNG3EFXS	Nut	4
	XSN3+15FXS	Screw	4
	XSN4+8FXS	Screw	
	XSNQ0004S	Nut	2

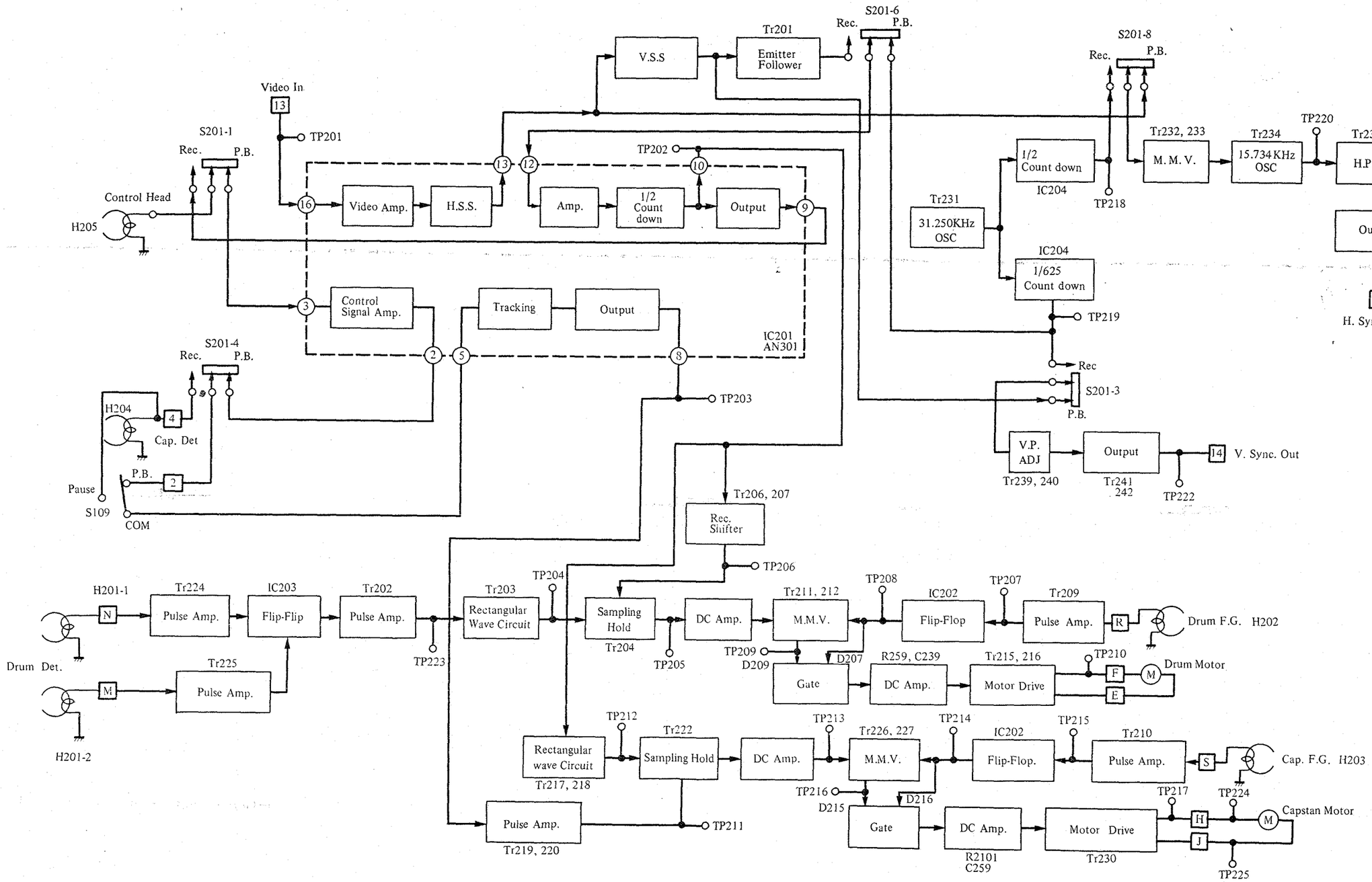
NV-3085-E VIDEO/AUDIO SECTION BLOCK DIAGRAM



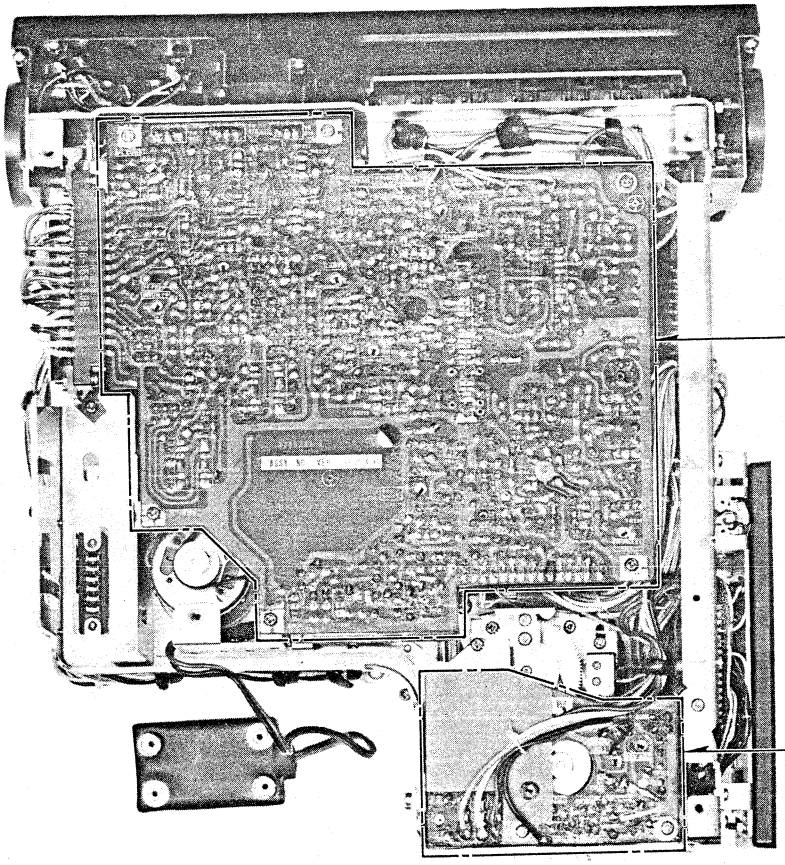




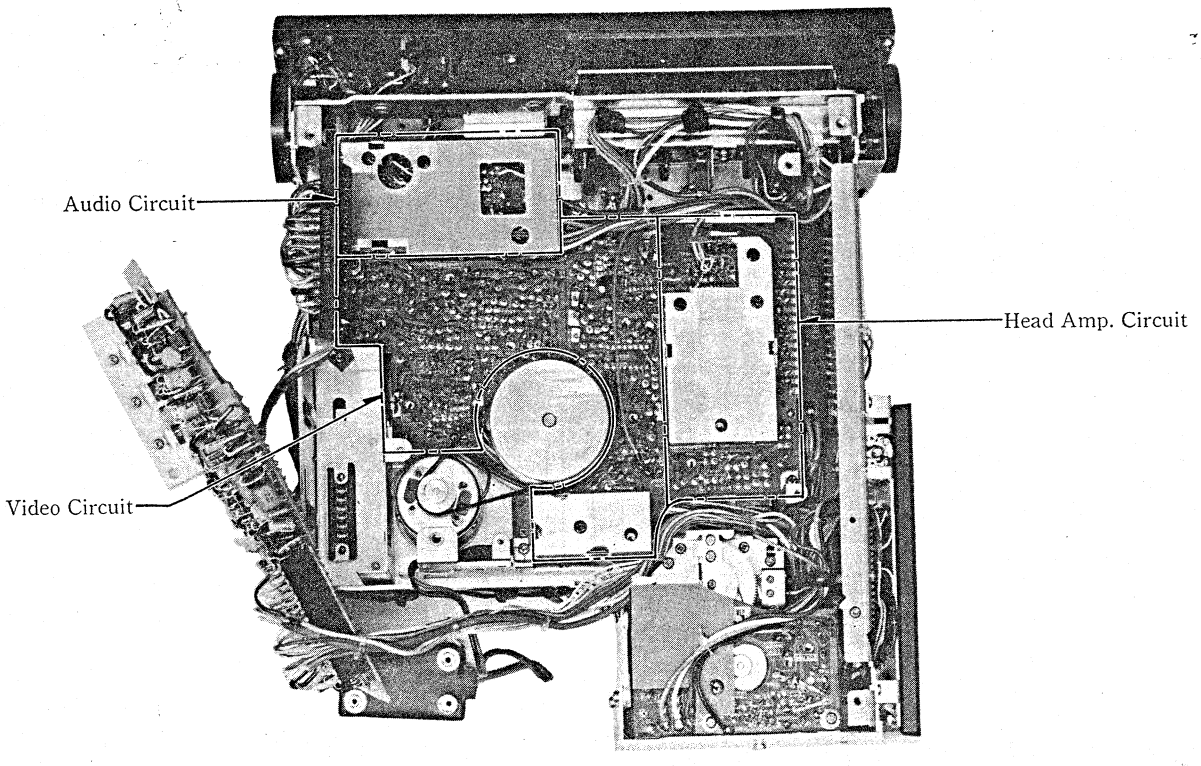
NV-3085-E SERVO CONTROL SECTION BLOCK DIAGRAM



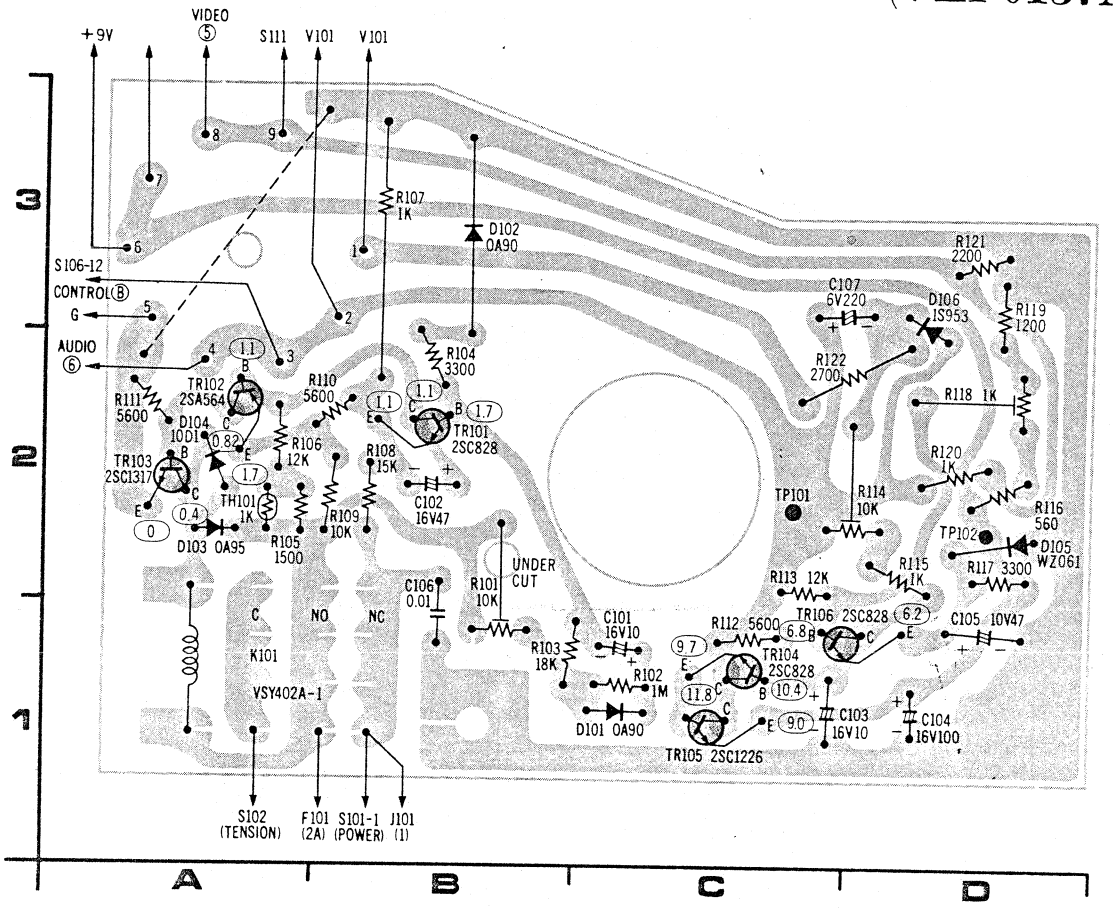
CIRCUIT BOARD LOCATON



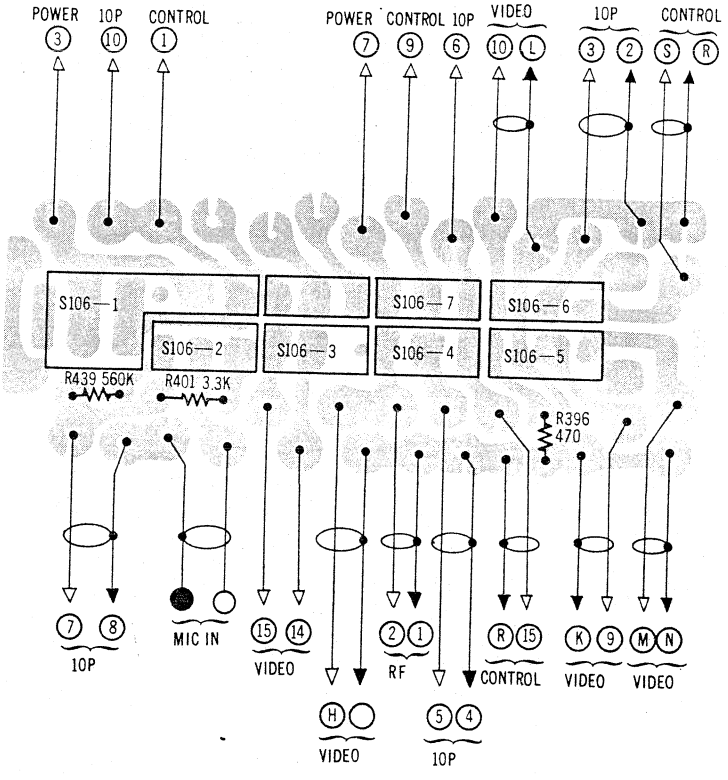
Audio/Video/Head Amp. Circuit VEP0345A



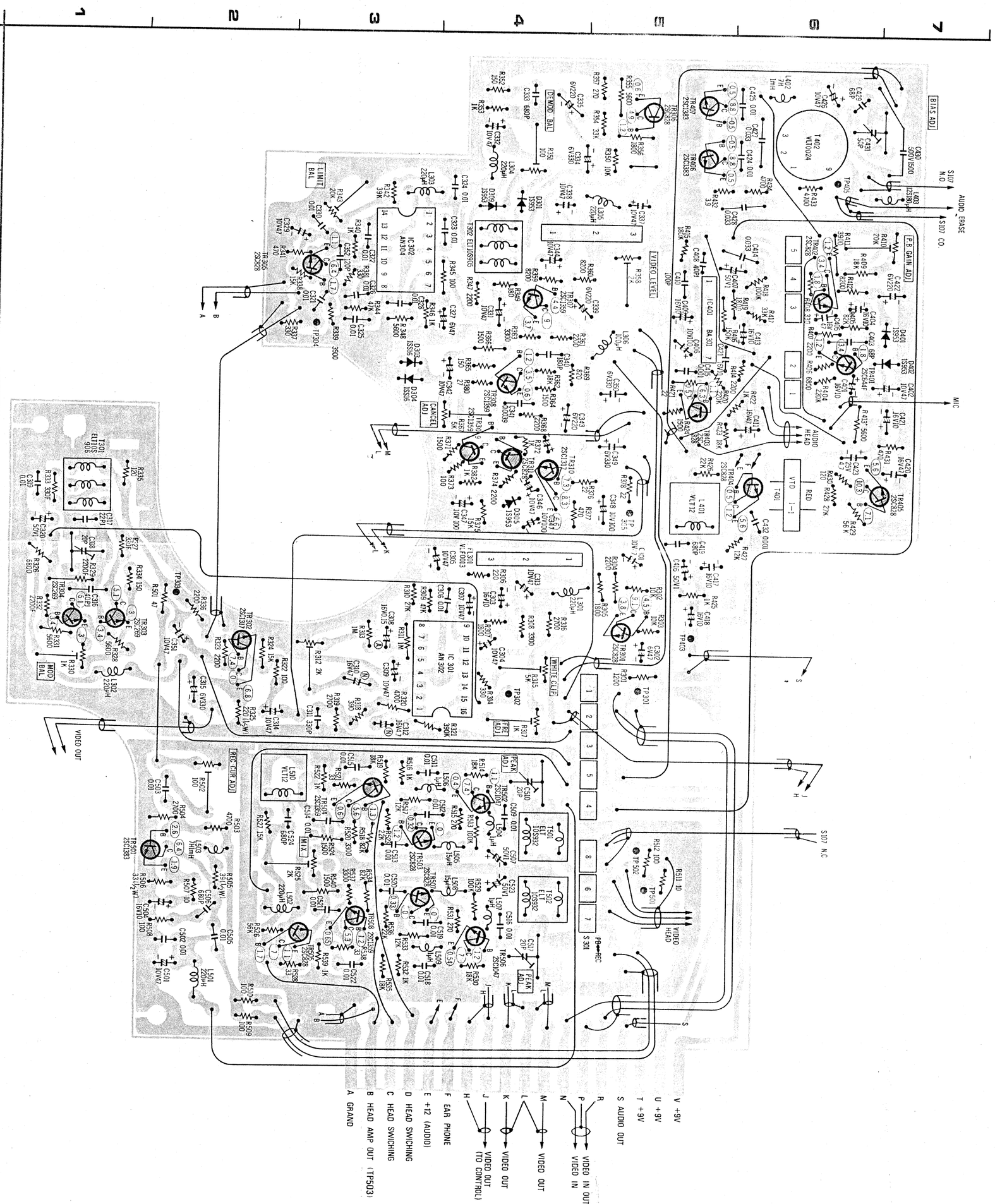
POWER SUPPLY CIRCUIT BOARD (VEP0137A)



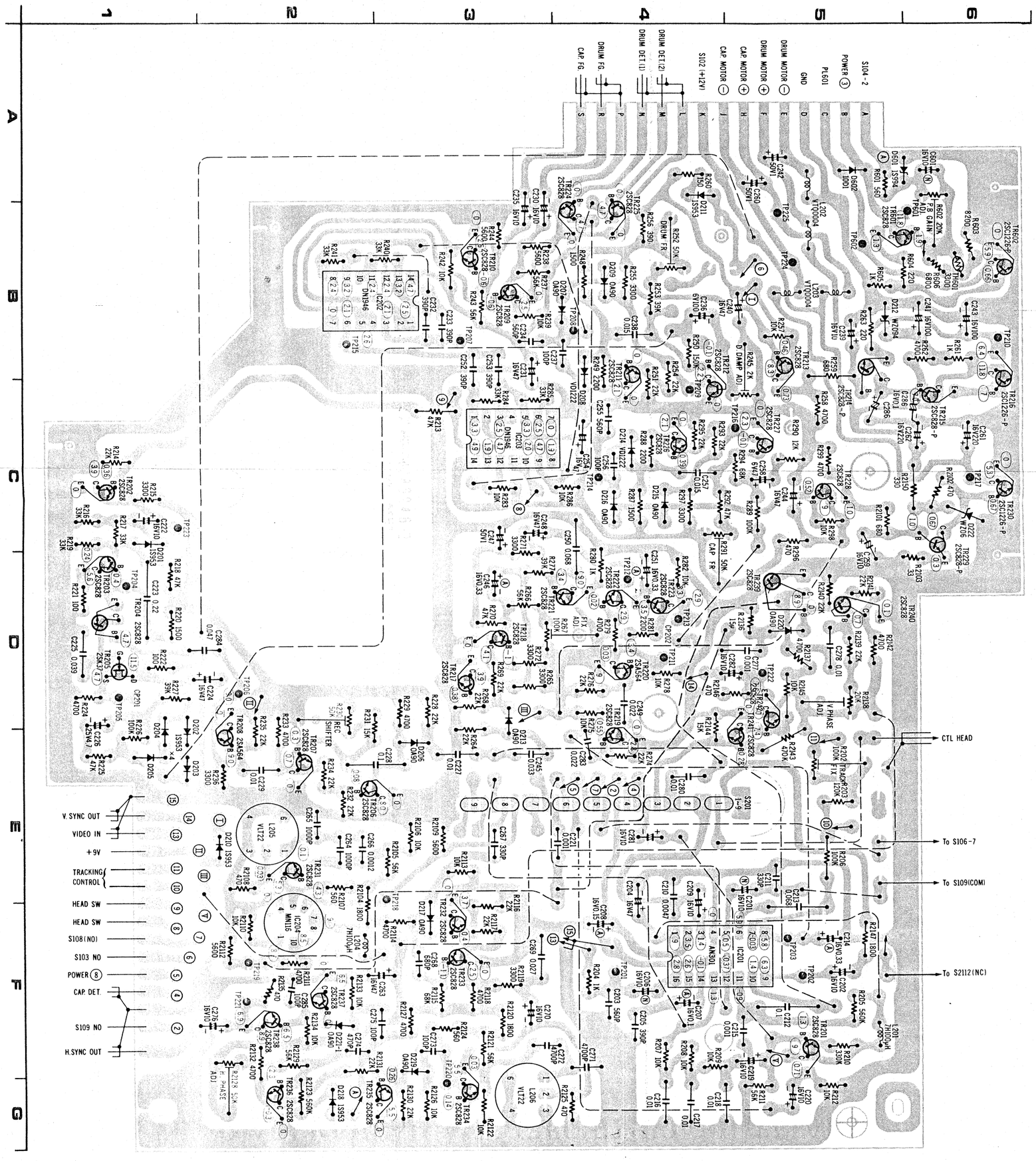
SWITCH CIRCUIT BOARD (VJB0127)



VIDEO/AUDIO/HEAD AMP CIRCUIT BOARD (VEP0345A)

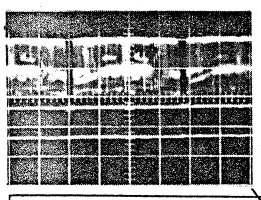


SERVO CONTROL CIRCUIT BOARD (VEP0246B)

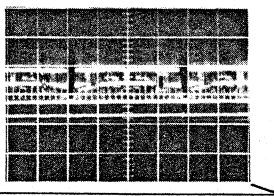


SCHEMATIC DIAGRAM PORTABLE VTR MODEL NV-3085-E

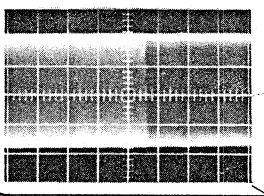
TP301 (Rec. mode) 0.5 V/5 msec. div.



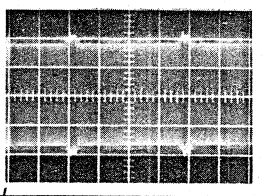
TP302 (Rec. mode) 1 V/5 msec. div.



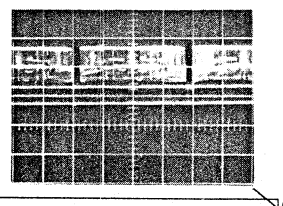
TP303 (Rec. mode) 0.5 V/5 msec. div.



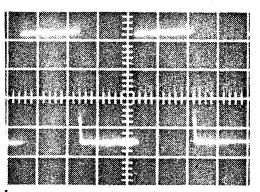
TP304 (Rec. mode) 0.05 V/5 msec. div.



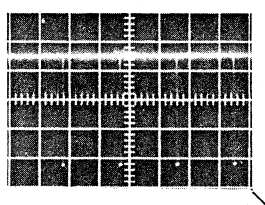
TP305 (Rec. mode) 1 V/5 msce. div.



TP223 2 V/10 msec. div.



TP222 2 V/10 msec. div.



REMARKS

1. Unless other
   K ±10% J;
2. Unless other
3. —#S— ... Sol
4. —#N— ... No
5. —/\/\/— ... Se
6. TP ..... Te
7. ⊏--⊐ ... Cu
8. S101 ... Po
9. S102 ... Te
10. S103 ... Of
11. S104 ... On
12. S105 ... Tra
13. S106 ... 1
14. S107 ... Au
15. S201, S301,

VIDEO/AUDIO/HEAD AMP CIRCUIT VEP0345A

Audio Circuit

Video Circuit

IC301 AN302

IC302 AN304

IC401 BA301

TR401 2SC644

TR402 2SC828

TR403 TR404 2SC828×2

TR405 2SC828

TR406 TR407 2SC1383×2

TR301 2SC828

TR302 2SC1317

TR305 2SC828

TR306 2SC828

TR307 2SC828

TR201 2SC828

TR202 2SC828

TR203 2SC828

TR204 2SC828

TR205 2SK37-K

TR206 TR207 2SC828×2

TR208 2SA564

TR209 2SC828

POWER SUPPLY CIRCUIT VEP-0137A

TR101 2SC828

TR102 2SA564

TR103 2SC1317

TR104 2SC828

TR106 2SC828

SERVO CONTROL CIRCUIT VEP0246

TR601 2SC828

TR602 2SC1226-P

TR217 2SC828

TR218 2SC828

TR219 2SC828

TR220 2SA564

TR221 2SC828

TR222 2SC828

TR223 2SC828

TR224 2SC828

J301 (Camera Mode)

1. VIDEO IN/OUT
2. G
3. V. SYNC
4. G
5. H. SYNC
6. SOLENOID DRIVE
7. AUDIO IN
8. G
9. G
10. +B

(TV Mode)

1. VIDEO IN
2. G
3. VIDEO OUT
4. G
5. AUDIO OUT
6.
7. AUDIO IN
8. G
9. G
10.

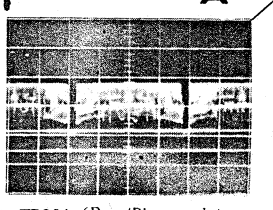
J304

1. G
2. AUDIO OUT
3. VIDEO OUT
4. RF OUT
5. +9V
6. G

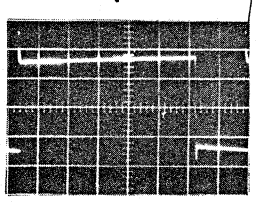
J101

1. CHARGE OR DC SUPPLY SWITCHING
2. DC OR PULSE IN
3. +B
4. G

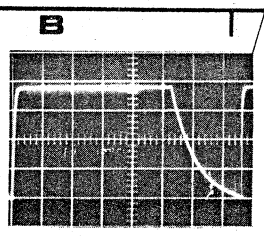
TP201 (Rec./Play mode) 0.5 V/5 msec. div.



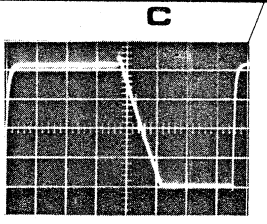
TP202 (Rec./Play mode) 2 V/5 msec. div.



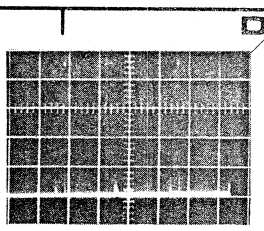
TP203 (Rec./Play mode) 2 V/5 msec. div.



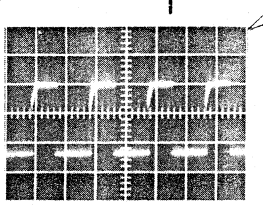
TP204 (Rec./Play mode) 2 V/5 msec. div.



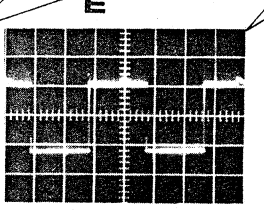
TP206 (Rec./Play mode) 2 V/10 msec. div.



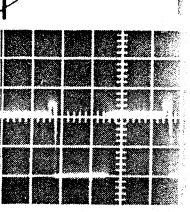
TP207, TP215 (Rec./PLay mode) 2 V/0.2 msec. div.



TP208, TP214 (Rec./Play mode) 2 V/0.2 msec. div.

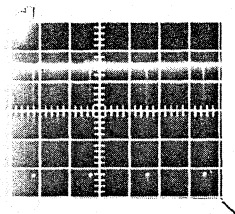


TP209, TP216 (Rec./Play m 2 V/0.2 msec.



V-3085-E

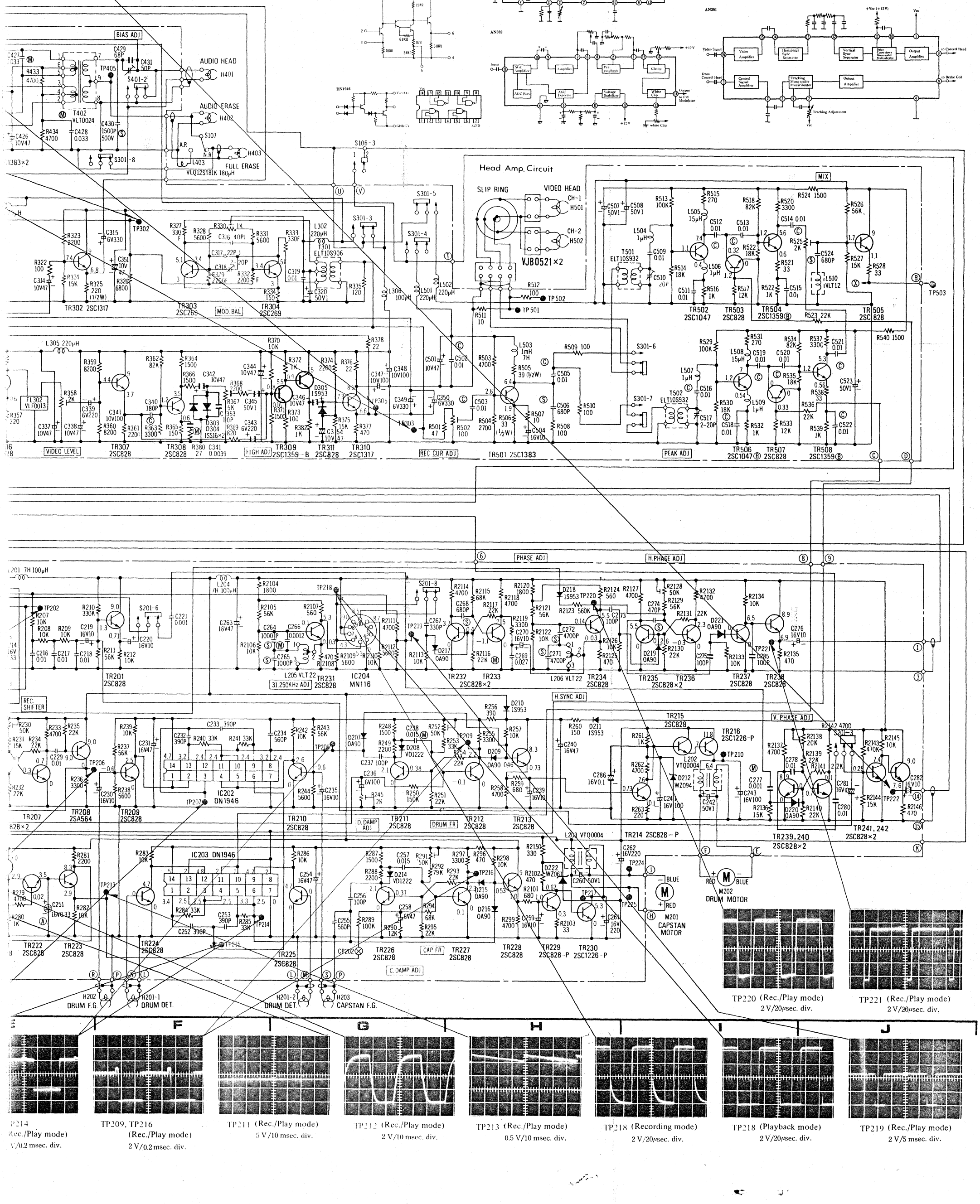
222 2 V/10 msec. div.



REMARKS

1. Unless otherwise specified. all resistor values are in ohms (Ω) 1/4W ± 5%. K ±10% J; ±5%, F; ±1%, K; 1000Ω.
2. Unless otherwise specified, all capacitor Values are in μF. PF; μμF.
3. —||(A)— ... Solid alminum capacitor. —||(S) Polyester capacitor
4. —||(N)— ... Non polarity capacitor. —||(C) Ceramic capacitor
5. —(VR)— ... Semi solid adjustment resistor.
6. TP ..... Test Point.
7. ⊏⊐ ... Circuit Board.
8. S101 ... Power SW.
9. S102 ... Tension SW.
10. S103 ... Off at FF & Rewind mode.
11. S104 ... On at PLAY mode.
12. S105 ... Tracking.
13. S106 ... 1 TV↔2 CAMERA (Showed in camera mode).
14. S107 ... Audio Dub↔Normal record (Showed in normal mode).
15. S201, S301, S401 ... Record↔Playback SW (Showed in P.B. mode).
16. K101 ... Under cut relay.
17. ⊗ ..... CU Cutting Point.
18. S108 ... ON AT BRAKE LOOSE.
19. 1/3 J. RESISTOR VALUES ARE IN Ω, 1/3W, ±5%

Measure the voltagesof Transistor in playback mode with a high sensitive VTVM, TR406, 407, 501, 304, 305 are measured in recording mode.



TP220 (Rec./Play mode) 2 V/20μsec. div.

TP221 (Rec./Play mode) 2 V/20μsec. div.

F

TP214 (Rec./Play mode) V/0.2 msec. div.

TP209, TP216 (Rec./Play mode) 2 V/0.2 msec. div.

G

TP211 (Rec./Play mode) 5 V/10 msec. div.

TP212 (Rec./Play mode) 2 V/10 msec. div.

H

TP213 (Rec./Play mode) 0.5 V/10 msec. div.

TP218 (Recording mode) 2 V/20μsec. div.

I

TP218 (Playback mode) 2 V/20μsec. div.

J

TP219 (Rec./Play mode) 2 V/5 msec. div.